FOOD ENGINEERING

April 1951

A McGRAW-HILL PUBLICATION • FORMERLY FOOD INDUSTRIES

35 CENTS

As exemplified in Sick's brewhouse, instrumentation is advancing malt liquor processing. (Page 93)

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Reading
FOOD ENGINEERING
means a more
profitable enterprise,
a better job—
MORE DOLLARS
IN YOUR POCKET

PROVED IN PERFORMANCE

Grinnell-Saunders Valves with CHEMICALLY INERT KEL-F* DIAPHRAGMS

Pat. App. For

Grinnell-Saunders Diaphragm Valves with KEL-F Diaphragms are living up to every promise made for them! At the right are reports from typical users.

KEL-F's resistance to chemical action, low cold flow, wide range of temperature application and exceptional flex life combine to make it the most important diaphragm development in years. KEL-F is chemically inert to all organic acids and alkalies in all concentrations. It withstands chlorinated aliphatic and aromatic compounds, concentrated nitric, chromic, hydrofluoric and sulphuric acids and most solvents which readily attack rubber and previous synthetic diaphragm materials.

While KEL-F is tough and flexible, it is not resilient. To provide resiliency for proper closure of the valve and to provide added support for the KEL-F diaphragm, it is backed with a rubber cushion. A free-floating method of attachment to the compressor assures an even closing pressure on the entire surface of the weir. A tube nut which floats as the rubber cushion presses down in closing the valve, eliminates excessive pressure on the diaphragm stud. The rubber cushions the closing force, thereby reducing wear and cutting action on the diaphragm. In accelerated tests, a 2-inch valve with a KEL-F diaphragm withstood over 80,000 closures, drop tight, against 80 pounds of air under water with no leakage and no visible signs of wear. Write for complete information.

Typical performance reports . . .

1. Chlorine and HCl gas with small amounts of acetic acid and acetyl chloride at 302° F. for 900 hours. Very much superior to material it replaced.

2. Mixed aromatic and ketone solvents at 230° F. and 10 psi for three months. No sign of deterioration.

3. Chlorinated organic chemical at 158 to 194° F. and 30 to 40 psi for nine months. No failure, no shutdown, no replacement.

4. Chromyl chloride at ambient temperature and 15 psi. Diaphragm condition good at end of thirty days' test.

5. Liquid chloral saturated with HCl at 158° F. for 408 hours. Well satisfied — have placed orders for additional diaphragms.

*"KEL-F" is the registered trade name for polytrifluorochlorethylene, an exceptionally stable thermoplastic. It is produced by the M. W. Kellogg Co.

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Food Engineering

APRIL, 1951 • VOL. 23, NO. 4

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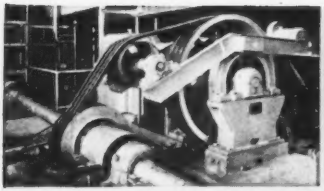
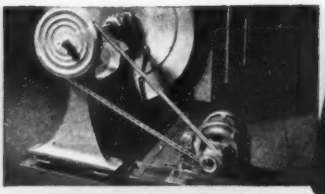
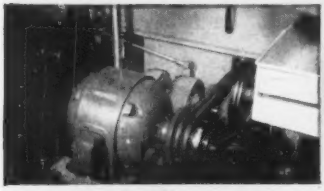


Paper Making Machine—Motion Control *Vari-Pitch* drive synchronizes paper machine sections.

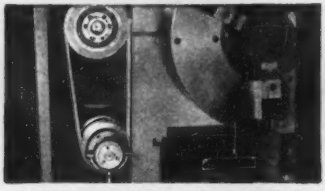


Air Conditioning unit — Stationary Control *Vari-Pitch* drive provides for seasonal adjustments.

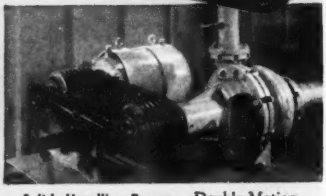
TEXROPE Drives for Speed Control



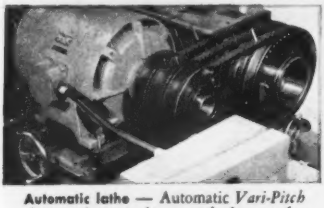
Cigarette Making Machine — Stationary Control *Vari-Pitch* drive provides for infrequent speed changes.



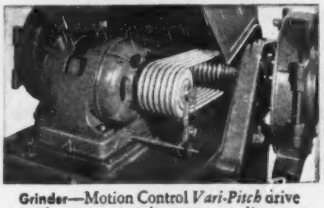
Pipe Threading Machine—Automatic *Vari-Pitch* drive gives simple, stepless handwheel speed changes.



Solids Handling Pumps—Double Motion Control *Vari-Pitch* drive provides extra wide speed range.



Automatic lathe — Automatic *Vari-Pitch* sheave gives stepless speed changes for making ultra-fine finish.



Grinder—Motion Control *Vari-Pitch* drive holds cutting speed constant as diameter of wheel wears.

Conveyor — *Vari-Pitch* Speed Changer raises or lowers speed to meet production requirements.

HOW USERS PROFIT
With *Texrope* Adjustable Speed Drives

TAKE A TIP from these users. Get the speed you need for peak efficiency by adding *Texrope* variable speed drives. Best of all, no elaborate equipment — no special costly motors are required.

You'll increase efficiency . . . get maximum output when you adjust speed to meet variations in: the part processed; tooling; machine loading; and temperature and humidity.

There's a type or size *Texrope* adjustable speed drive to fit any requirement. Whether you need to change speeds rarely or frequently — when the machine is shut down, or when it's running — whether you're using one horsepower or 50, Allis-Chalmers can supply you.

In addition, Allis-Chalmers offers you more than the drive itself. A-C offers the extra engineering skill that naturally results from having more industrial V-belt installations than any other manufacturer. This in itself is important.

Get section 20P50 for complete engineering information on *Vari-Pitch* sheaves from your A-C Authorized Dealer or Sales Office, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Choose from These Types of Variable Speed Drives

VARI-PITCH SHEAVES for A-B, B, C, D, and E belts — speed variation 15% to 25% per sheave. Capacities 1 to 125 hp. Stationary type — for changing speed when motor is stopped. Motion Control type—for changing speed when motor is running.

WIDE RANGE VARI-PITCH SHEAVES for Q or R wide belts provide up to 2 to 1 speed range . . . fractional to 40 hp. Available in Stationary Control and Automatic types.

VARI-PITCH SPEED CHANGER — enclosed unit for adjusting speed while machine is in motion. Provides up to 3.75 to 1 speed range. Capacities 1 to 75 hp.

A-3262

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

PRACTICAL IDEAS

Hog-Gland Removal Made Easy

An ingenious method for removing the pituitary gland from a hog without the necessity of complex equipment has been developed in our meat packing plant in Montreal.

Essentially, the process involves a nickel tube, a glass jar, and a vacuum.

ACTH, one of the new wonder-hormones which is extremely effective against arthritis, with fewer undesirable side reactions than the other miracle worker, Cortisone, is obtained from the pituitary glands of hogs. Unfortunately, it has been too scarce for anything like general distribution. To produce a single ounce of ACTH requires the pituitary glands of 36,000 hogs.

Hence, if the supply is to be increased, it is essential that as many meat packers as possible remove hog pituitary glands for processing. The job is complicated by the fact that the glands must be removed and frozen within an hour, roughly, of the killing.

We smaller packers, not being able to afford costly equipment and manpower needed to perform this operation by actually exposing the gland within the skull and removing it, had been stymied. But not now. Here's how our plant removes the gland:

As newly slaughtered hogs move past him, a skilled worker probes with the nickel tube through the Atlas joint of the skull, until the tube rests against the pituitary gland. Then, he applies vacuum to the tube—and the gland is sucked into the glass jar. Only a few seconds are required for the entire operation.

Every few minutes, the jar is emptied onto a sieve, where the glands are sorted out and are then placed on ice. Two men are needed for the entire process.

Nickel tubing was chosen for this operation since sanitation was the keynote. It was necessary to select a metal that would neither harm the pituitary gland nor contaminate the edible portions of the hog.—*Wilsil Limited, Montreal.*

Starch Dusting Brings 4 Benefits

Four distinct advantages are gained by using cornstarch in large-scale mechanical dusting of food products.

They are: (1), Starch-dust accumulations will not support insect life, thus infestation is controlled by the most desirable method—prevention; (2), in many cases, it is possible to reduce the frequency of cleaning without sacrificing sanitation; (3), it is often feasible to completely eliminate the use of insecticides and fumigants; (4), the cost of the material is greatly reduced, since cornstarch may be dusted at a much lower rate than flour.

Bakers and other food processors, who must dust their product in process to prevent it from sticking, commonly have used wheat flour. But about two years ago, a preven-

$50 EXTRA FOR BEST ITEM

You are invited to submit Practical Ideas. You will be paid at regular rates when your item is printed and if it is judged best for the month you will get an additional payment of $50.

Selection of the best contributed item will be made by a group of 200 readers each month, and the item title and author's name will be cited (see below).

Practical Ideas may describe any type of device or method recently developed to solve a problem, speed an operation, or make some task easier. They may concern factory, laboratory, warehouse, or power-plant operations in the food industry. Ideas on management, maintenance, and trucking or shipping also are suitable.

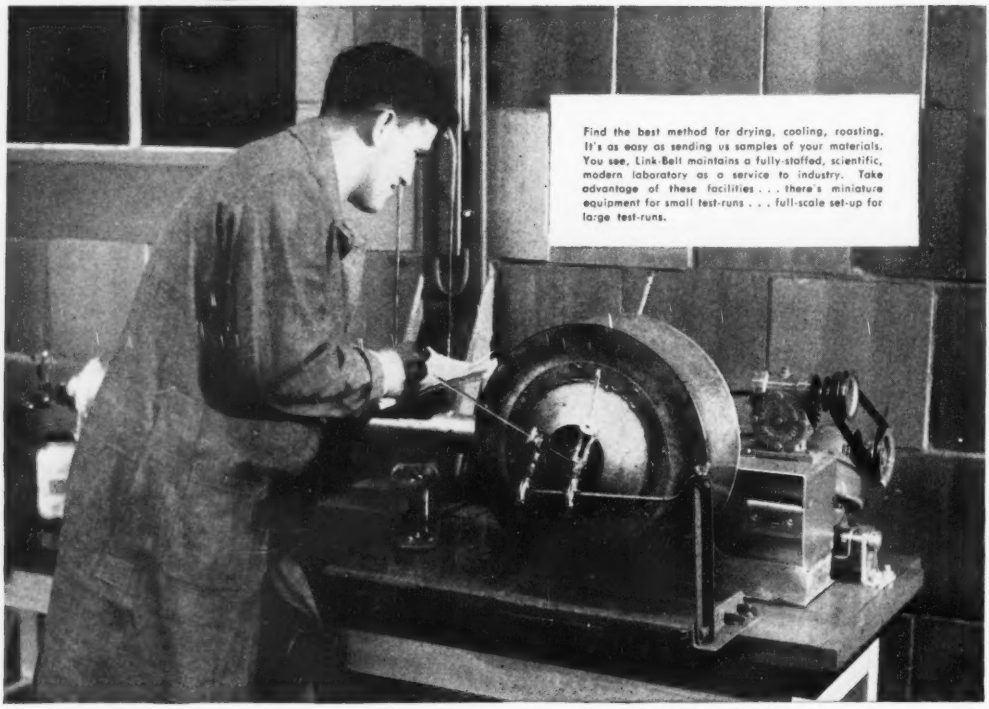
You need not be an experienced writer or draftsman to submit these ideas. The text will be edited and sketches converted to finished drawings.

Send your items to: Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 18, N. Y.

FEBRUARY PRACTICAL IDEA voted best was "Projection Method Speeds Bacteria Counts," submitted by T. Knowles, General Electric Co., Nela Park, Cleveland. It tells how use of a standard lantern-slide projector will simplify colony-tabulation work.

AN INVITATION
to manufacturers with drying, cooling or roasting problems...

LINK-BELT will assist in developing your process


Find the best method for drying, cooling, roasting. It's as easy as sending us samples of your materials. You see, Link-Belt maintains a fully-staffed, scientific, modern laboratory as a service to industry. Take advantage of these facilities . . . there's miniature equipment for small test-runs . . . full-scale set-up for large test-runs.

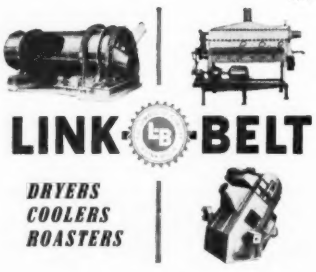
Even with a small sample, we will test-run your material, work out procedures in the laboratory that can be duplicated in your plant...

Many products become marketable only after commercially practicable drying, cooling or roasting processes have been developed. That's where Link-Belt can give you the answer in advance... before you've spent a cent!

More than 1000 such laboratory tests have already been made. And as a result, 500 Link-Belt Dryers now step up capacity and improve quality of over 100 different products.

Ask for a test of your own materials. If you can't ship samples—ask for a unit on loan to try out right in your own plant. Why not contact your nearest Link-Belt office or plant for particulars? Now!

12,252

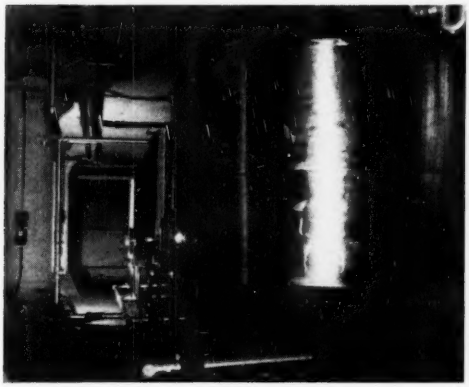


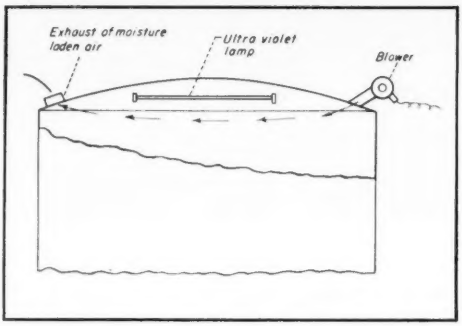
LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices in principal cities.

tive-sanitation consultant, making a survey of a bakery, observed that there were no signs whatever of insect infestation in places he knew to be vulnerable.

Inquiry brought out the fact that cornstarch, instead of flour, was used here for dusting the doughs. Hence the dust deposits found in the equipment, on ledges, and in out-of-the-way places, naturally consisted of starch instead of flour. A check was then made with experienced entomologists, and it was revealed that cornstarch is not nutritionally satisfactory to insects commonly found in stored products and food plant dust accumulations.

Observations were subsequently made by the sanitarian in a considerable number of plants which, at his suggestion, changed to starch dusting. It was established that this switch from flour to cornstarch essentially eliminated infestation in the equipment and in locations where the dust from the operation would settle.—*J. Carl Dawson, Food Plant Preventive-Sanitation Consultant, P. O. Box 184, St. Louis 21, Mo.*





Device Stops Condensation in Tanks

Use of a small, easily installed electric heater-blower prevents moisture from condensing in tanks being filled with liquid sugar.

This bulk syrup is received hot via trucks, and pumped into the food plant's storage tanks, where it is kept prior to use. But if these tanks are cold, vapor from the hot syrup may condense on the inner surfaces of the tank and drain back to dilute the liquid sugar at the surface level and encourage spoilage. Ultraviolet lamps near the top of the tank are a definite help, but their efficiency falls as the level of the syrup is lowered.

True, some processors enclose storage tanks in steam-coil heated rooms and thereby maintain tank surfaces at a temperature above the condensing point. But this method, while satisfactory, is costly.

An inexpensive method entails the use of only a small electric blower, and it prevents condensation even when the storage tanks are in a cool area of the plant.

The electric heater-blower—similar to the hand "gun" used for drying hair in a beauty parlor—brings hot air in at one side of the top of the tank, and moisture-laden air is exhausted through a filter at the other side (see sketch). This warm air keeps the tank surfaces above the condensing point and carries any vapor formed out the exhaust pipe. Condensation of vapor and surface dilution are thus avoided at very little cost.—*E. F. Hansen, Production Manager, Nedick's, New York City.*

Angle Stacking Speeds the Job

By placing incoming raw materials in production storage at an oblique angle, we speed the tiering operations and save aisle space in our packaging material plant, The Dobeckmun Co., Cleveland.

Raw materials, received from box cars or highway trucks, are stored in palletized loads, tiered three high, at a warehouse located about three miles from the plant. When the material is needed for production, it is delivered to the plant by the company's three semi-trailer highway trucks.

At the plant, the palletized material is unloaded with the aid of a 3,000-lb. capacity electric fork truck, and delivered directly to production storage. Here, it is placed on pallet racks or stacked at an angle to the aisle, as shown in the above photo.

Although requiring slightly more floor space than right-angle stacking, the oblique method is used because the aisle-space saving and speed-up in tiering and removal of loads far outweigh the former factor.

Time in delivering raw material to production is especially important to us, because very little floor space is available alongside the machines for stacking the material. Equally important is the fact that with the fork truck-pallet method we can now store two to three times more material in usable storage space than was formerly possible. —*Frank G. Swain, Plant Manager, The Dobeckmun Co., Cleveland.*

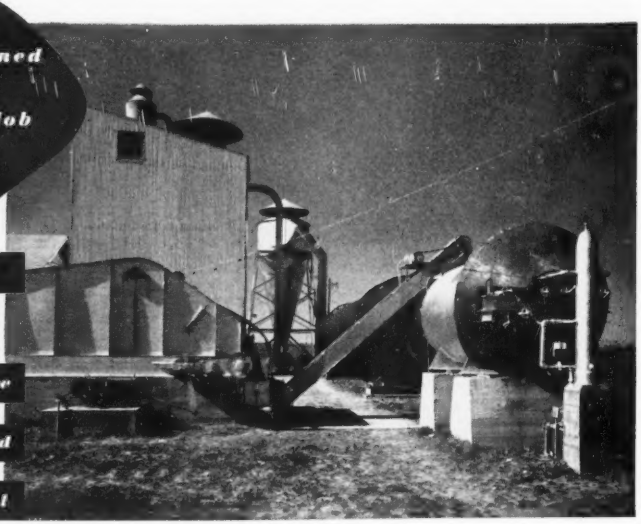
See Louisville for

CREATIVE DRYING ENGINEERING

New Louisville "Type H" dryer retains higher carotene content at low cost

Gives you a premium product to sell at ordinary prices

Designed to do your job best!



For a Variety of Products

Dry chopped alfalfa • Shredded sweet potatoes
White potato meal • Beet pulp,
many other root crops

High Capacity—Low Temperature

Complete Plant Can Be Furnished

No Flame Contact with Material

Keep that carotene to make more money! The Louisville "Type H" Dryer was developed to retain the maximum possible carotene value in chopped alfalfa while drying at high production rates. Its notable success with chopped alfalfa is repeated in the handling of a variety of feedstuffs including sweet potatoes and other root crops.

Behind this success story is a history of more than 50 years in the designing and building of Louisville Dryers to meet the widely varying needs of industry. Write for new "Type H" Dryer Bulletin.

Other General American Equipment:
Turbo-Mixers, Evaporators, Thickeners, Dryers, Towers, Tanks, Bins, Filters, Pressure Vessels

PROCESS EQUIPMENT DIVISION
GENERAL AMERICAN
TRADE MARK

Louisville Drying Machinery Unit
Over 50 years of creative drying engineering
GENERAL AMERICAN TRANSPORTATION CORPORATION
Dryer Sales Office: Hoffman Bldg., 139 So. Fourth Street
Louisville 2, Kentucky
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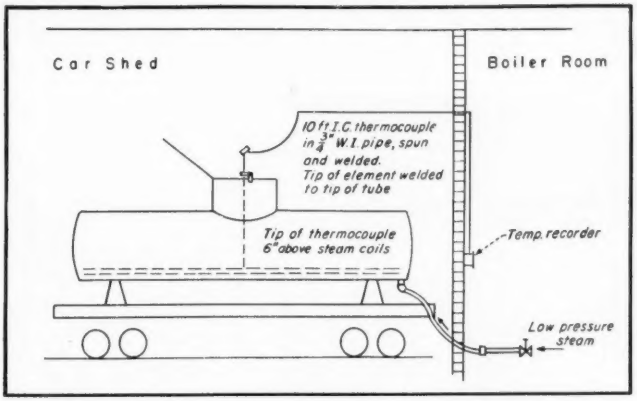
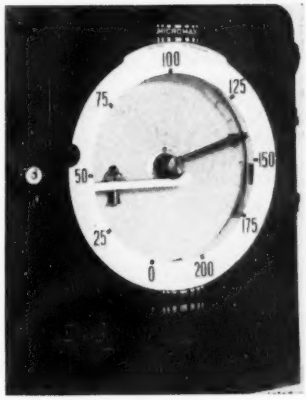
Offices in all principal cities


Car Shed
Boiler Room
10 ft I.C. thermocouple in ¾" W.I. pipe, spun and welded. Tip of element welded to tip of tube
Tip of thermocouple 6" above steam coils
Temp. recorder
Low pressure steam



Avoids Scorching of Vegetable Oils

Use of a temperature recorder involving a unique thermocouple hook-up has eliminated scorching in the unloading of refined vegetable oils at the plant of a margarine manufacturer.

The temperature record is also of great value, because: (1) It shows the operator exactly the condition of the oil in the car during melting, (2) confirms to management that melting was accomplished in the prescribed manner, and (3) provides evidence if the tank car of oil has been scorched prior to the company receiving it.

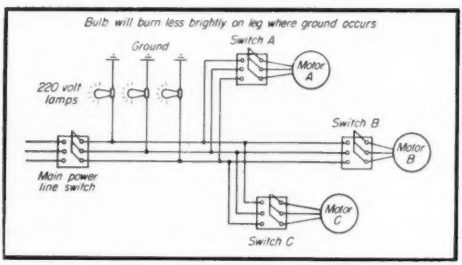
The layout is as follows: Two Micromax recorders are installed in the boiler room of the plant. The heat-sensing assembly is comprised of a 10-ft. I.C. thermocouple in ¾-in. W.I. pipe. Tip of the sensing element is welded to the tip of the tube. The 10-ft. long thermocouples are located just outside the boiler room in a big shed which can house four tank cars of refined vegetable oil. The thermocouples have 50-ft. extension leads which permit them to be installed in any of the cars on the siding with a minimum of inconvenience, there being no connections to be changed by the operators.

In operation, the manhole cover on the car is opened, and the thermocouple is pushed down through the solidified oil until it touches a steam coil near the bottom of the tank car. Upon touching, the thermocouple is redrawn, a few inches, and clamped in this position. The clamp fastens to the side of the manhole turret. Location of the steam coil in cars differs. Thus it's necessary to gage each car.

With the thermocouple thus located very close to the steam coil, steam is admitted at very low pressure to the car for an initial melting stage. When the oil, immediately adjacent to the steam coil, melts out to the thermocouple tip, an instant rise in temperature on the recorder is indicated, although this change is only a few degrees.

At this stage, steam pressure can be increased through the coils, since the recorder gives a very accurate measurement of the actual temperature of the oil. Thus, maximum rate of heat input can be applied without raising the temperature of the oil to the scorching point.

Since the system has been installed, the company has never damaged any oil by scorching during the melting process. It is readily understandable that scorching of a tank-car load of refined vegetable oil can be costly.—*Leeds & Northrup Co.*, 4986 *Stenton Ave., Philadelphia* 44.



How to Detect Motors Leaking to Ground

Through the installation of "ground lamps," as illustrated in above diagram, Bellows Falls Cooperative Creamery, Bellows Falls, Vt., quickly locates motors with leakage to ground.

It is an accepted fact that many motors in the dairy and other food processing plants develop a ground, due to moisture, and eventually burn out.

The "ground lamps" consist of a bank of three 220v. bulbs each connected to the ground and attached on the opposite end to the three line service.

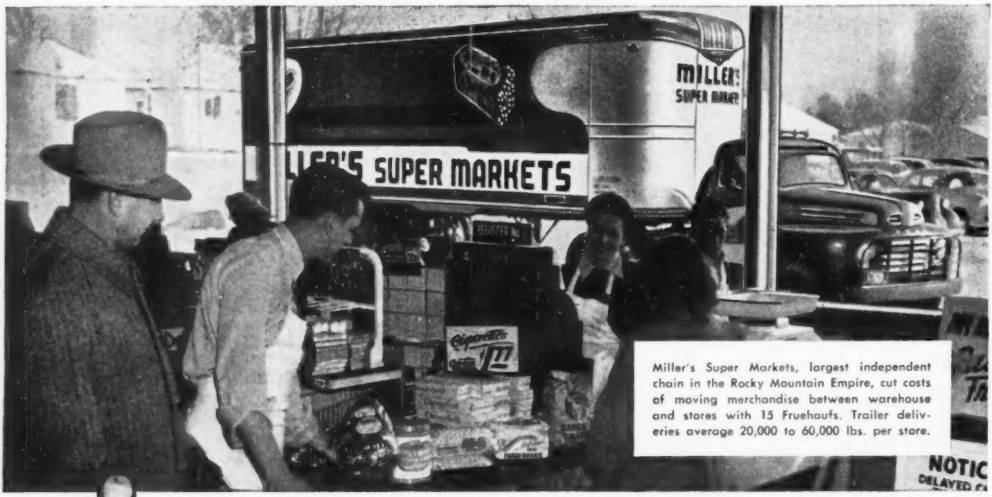
When there is a ground of any appreciable amount on one of the lines, the voltage will drop and the brightness of one of the lamps will diminish. Another helpful feature of this set-up is that two lights will dim if the motor is single-phasing.

Work stoppage is eliminated by having the maintenance man work at night. He turns on each of the lights, one at a time. And if there's any tell-tale dimming the faulty motor is spotted, and the necessary corrective measures can then be started.

If the maintenance man is not an electrician, it is good practice to call in a motor repairman to correct the situation.

An example of how the Cooperative uses the system is as follows: Suppose that one of the three lights burns dimly during operating time. There is enough power to sustain the operation until completion. Then (see diagram) the maintenance man connects switch "A" for motor "A", checks the lamps, and finds proper brilliance indicating motor is functioning up to par. He then connects switch "B" and again inspects lamps. Finding them bright he disconnects "B" and hooks up "C". This time he finds lights burning dimly, thus indicating a leak due to moisture or some other cause.—*Based on item in Cherry-Burrell "Circle", Cherry-Burrell Corp., Chicago.*

TRAILERS TRIM COSTS for TODAY'S BIG "SUPERS"!



Miller's Super Markets, largest independent chain in the Rocky Mountain Empire, cut costs of moving merchandise between warehouse and stores with 15 Fruehaufs. Trailer deliveries average 20,000 to 60,000 lbs. per store.

Paul Cohen, Supt. of Warehousing & Transportation, Miller's Super Markets

"WE MOVE TWICE AS MUCH... TWICE AS FAST... AT HALF THE COST... WITH TRAILERS"

"IN OUR OPERATION, every step taken to trim distribution costs enables us to pass extra savings on to our shoppers.

"We've *doubled the volume and speed* of our deliveries and *trimmed our operating costs in half* by 'trailerizing' our truck fleet," reports Paul Cohen, Supt. of Warehousing & Transportation, Miller's Super Markets, Denver.

"Our Fruehauf Aerovans were placed in service in 1946. Other than regular maintenance, periodic painting and negligible repairs, not a penny has been spent on these units in 5 years of steady 6-day-a-week operation.

"Our refrigerated Aerovans hold their temperatures — protecting the appetizing goodness of our daily-fresh edibles.

"Not only do we consider our Fruehauf Trailers essential to our operation, but we feel this fleet of handsome 'rolling billboards' is a major advertising asset."

The food field is just one of over 100 different industries — businesses large and small—finding in Fruehauf Trailers the way to faster, lower-cost distribution. It will pay you to investigate their application to your business.

Write today for Fruehauf's *free* "Transportation Cost Analysis." The Fruehauf Trailer Co., 10956 Harper Ave., Detroit 32, Mich.

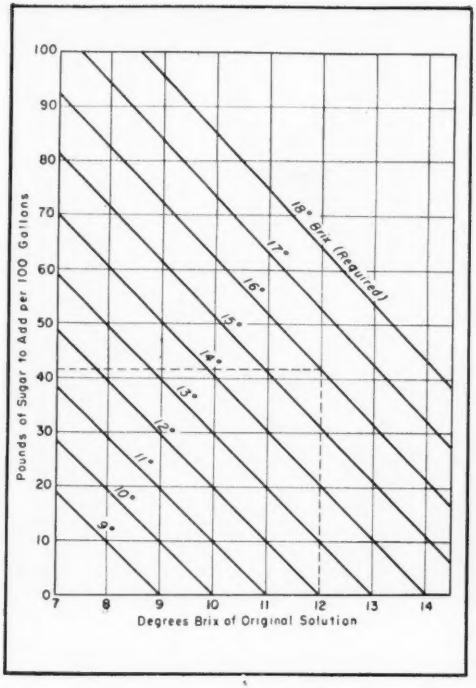
FOODS GET BETTER RIDE!—Exclusive Gravity-Tandem Suspension gives loads a level, cushioned ride. Self-steering action saves tires and fuel . . . cuts product damage. *Users get up to 4 times normal tire service!*

FOODS GET BETTER PROTECTION!—Exclusive integral-frame construction gives greater strength with less weight . . . for bigger load capacity. Trailer is engineered throughout for long life with low upkeep.

FRUEHAUF *Trailers*

World's Largest Builders of Truck-Trailers

YOUR FOOD — and almost all your daily living necessities — are brought to you all or part way by Trucks and Trailers. They make up Motor Transport — our nation's largest transportation system — employing 1 out of every 7 American people.



How Much Sugar? Chart Tells

Here's a chart that will help you when you have to increase the original Brix of a processed fruit juice by adding cane or beet sugar.

The chart makes the figuring necessary for this operation easy. The diagonal lines, labeled "Brix Required", used with the horizontal scale labeled "Brix of Original Solution", yield on the vertical scale the number of pounds of sugar to add to 100 gal. of a fruit juice to raise its Brix to a desired value.

Although the attached chart was prepared for use with citrus fruit juices, the following data on its construction will enable processors in other food fields to extend the values shown to include those which may be applicable to their own particular needs.

The curves were plotted from data given in *Handbook of Chemistry and Physics* (29th ed., Hodgman, C.D., Chemical Rubber Pub. Co., Cleveland). Consider, for example, a juice having a value of 12 deg. Brix. From the tables, a solution (sucrose) of 12 deg. Brix contains 104.8 lb. of sugar per 100 gal. The specific gravity of a 12 deg. Brix solution (sucrose) is 1.0465. Therefore, since 1 gal. of water weighs 8.35 lb., 100 gal. of solution weigh—

$$100 \times 1.0465 \times 8.35 = 874 \text{ lb.}$$

Now, let p = number of lb. of sucrose to add to 100 gal. of solution to yield a desired value of 16 deg. Brix,

Then
$$\frac{100\,(104.8 + p)}{(874 + p)} = 16$$

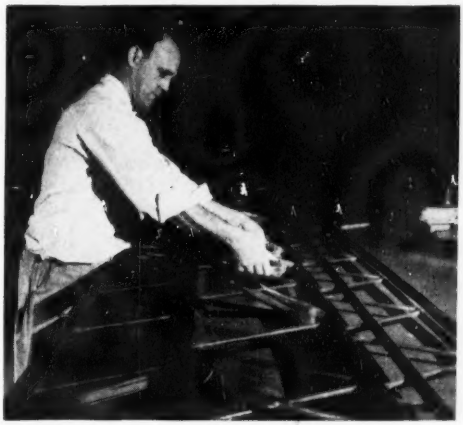
and p = 41.6 lb. of sucrose.

Data for the other points are similarly determined. However, if the present chart is to be utilized by the reader for other needs, additional curves may be added without further calculation. It will be noted that all diagonal lines are parallel, and pass through their respective values along the horizontal scale labeled "Brix of Original Solution." Additional curves may be added by simply drawing straight lines parallel to those shown in the chart and passing through their respective values along the horizontal scale.

A specific problem will illustrate the use of the attached chart:

Example: Brix of an orange juice is to be increased from 12 to 16.

Solution: Enter chart along horizontal scale labeled "Brix of Original Solution" at value 12. Proceed upward, along scribed line, until diagonal line labeled "16°" (Brix required) is intersected. Then, follow left on the horizontal scribed line to the lefthand vertical scale labeled "Pounds of Sugar to Add Per 100 Gallons." Here, the reading is 41.6 lb. of sucrose (or beet sugar) per 100 gal. of original juice as the requirement to raise the Brix to the desired value of 16.—*Joseph T. Hogan, 2713 N. Roman St., New Orleans 17, La.*



Many Uses for Those Grip Pliers

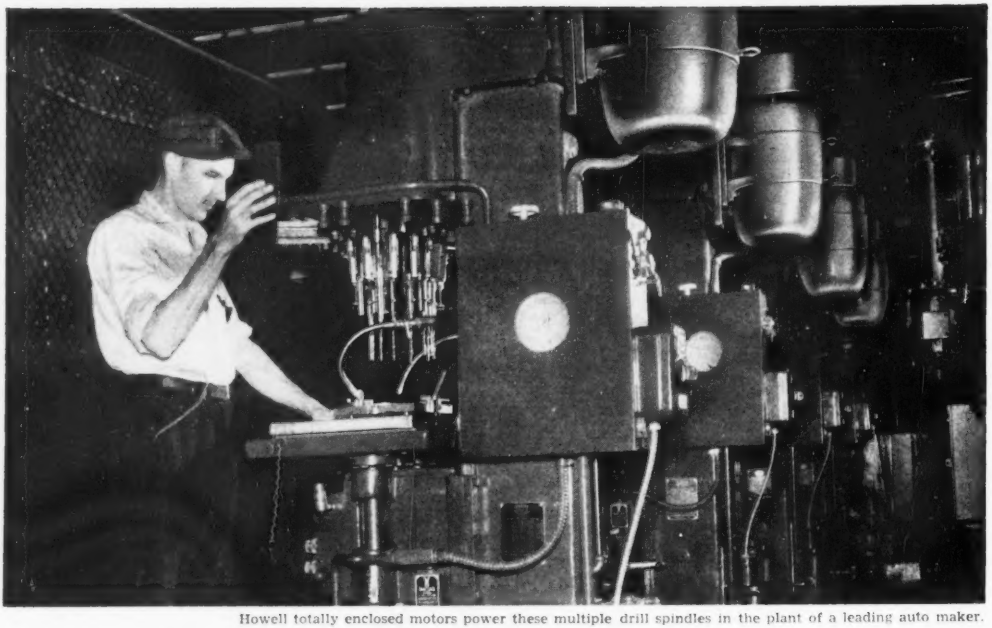
As "fixer-uppers", grip pliers save the time and effort of someone every day in the plant of Taylor Reed Co., at Glenbrook, Conn.

The company finds them "as useful and necessary as baling wire to a farmer."

In the case illustrated, girders to support a concrete floor are being fabricated from angle iron and rods. A templet was first made and the angle iron fastened to the templet for welding. The usual method of attaching members to a templet for welding is to use screw clamps. But this way is slow for the original setting and for readjustment.

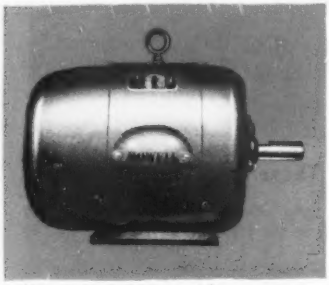
Use of the grip pliers has greatly reduced fabricating time per girder. And the pliers interfere less with the welding operation than do clamps. They can be depended on to hold the metal secure.

Grip pliers have been found dependable for holding pieces of metal together for every welding operation within the jaw range. And they also serve many other functions in plant operation and maintenance routine. Frequently, one or more are used to hold broken parts together until the maintenance crew can do a permanent welding job, or they hold a temporary machine improvement in place while it is being tested and adjustments are made for final welding. —*W. A. Reed, Plant Engineer, Taylor Reed Co., Glenbrook, Conn.*

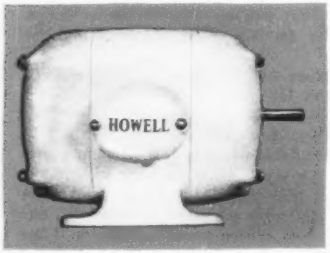


Howell totally enclosed motors power these multiple drill spindles in the plant of a leading auto maker.

HOW MUCH ARE ELECTRIC MOTORS WORTH?



Howell Type K Motor. Offers constant performance in the presence of dirt, dust, fumes and moisture. Sizes from 3 to 150 H.P. at 1800 R.P.M. Either vertical or horizontal mounting.



Howell Sanitary Motors meet the most exacting standards of the dairy and food industries. They contain no pockets, cracks, or crevices. Available for vertical or horizontal mounting.

The actual cost of the motors you see pictured here amounts to hundreds of dollars.

But their true worth, in terms of supplying the power for these multiple drill spindles to turn out finished parts, runs into thousands.

It's tough applications like this which prove the real value of Howell Industrial Type Motors. For your jobs, Howell serves three ways: (1) by engineering electric motors to your job; (2) by furnishing motors of the highest quality; (3) by serving you after the sale.

May we apply our facilities and engineering ability to your problems?

HOWELL ELECTRIC MOTORS COMPANY

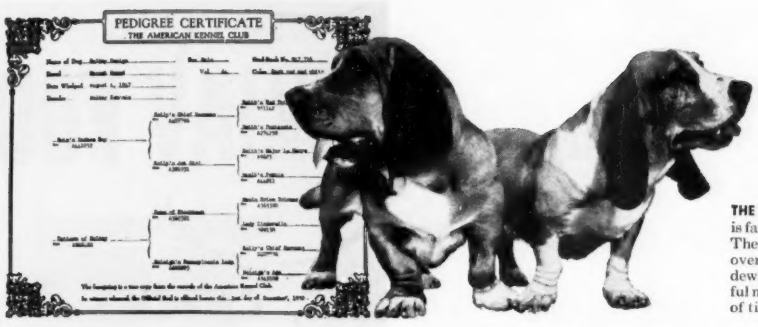
Howell, Michigan

HOWELL Red Band MOTORS

HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Precision-built industrial motors since 1915



THE BASSET HOUND, a hunting dog, is famous for his keenness of scent. The ears are long enough to fold over the tip of the nose and heavy dewlaps hang from a short powerful neck. The short legs are capable of tireless action.

"Pedigree" is a Fancy Name for "Quality" . . . in Bassets or in Boxes

AND in both cases, it's earned by knowing and controlling every step in development, right up to the finished article.

UNION traces the ancestry of its corrugated containers all the way back to Union-owned forests . . . controlled through every step of manufacture in Union mills (largest in the world) and right up to the shipping of Union boxes to your plant.

That earns a pedigree for Union boxes, because you *know* you can depend on every shipment being up to the same high standards. You can reduce breakage, pilferage, returns.

Union Carbide and Carbon agrees, and ships its nationally known Prestone Anti-Freeze all over America in Union's *pedigreed* boxes—just as hundreds of other famous firms do.

Dependable Packaging Since 1872

UNION Corrugated Containers

UNION BAG & Paper Corporation

Principal Offices: WOOLWORTH BLDG., NEW YORK 7, N. Y.

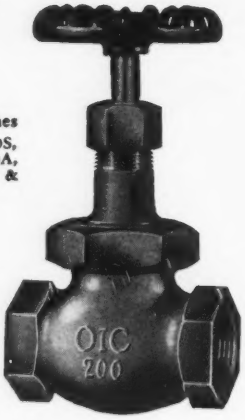
Corrugated Container Plants: **SAVANNAH, GEORGIA • CHICAGO, ILLINOIS • TRENTON, NEW JERSEY**

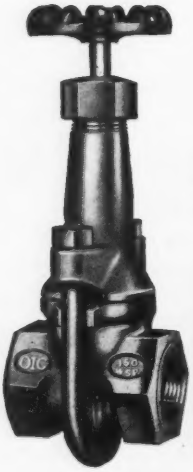
OIC FOR

GATES, GLOBES, ANGLES, CHECKS
There's this long line to choose from...

BRONZE

⅛-inch to 3-inches
125S, 150S, 200S, 300S, 350S, 300A, 200, 400, 2000 & 2500WOG.



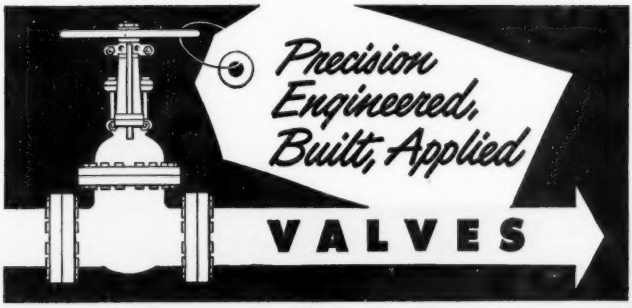


IRON

1¼-inch to 16-inches
125S, 150S, 250S, 175, 200, 400 & 500 WOG.
CLIP GATES—¼-inch to 4-inches.

OIC
FOUNDED 1883

ANY VALVING REQUIREMENT



FORGED STEEL

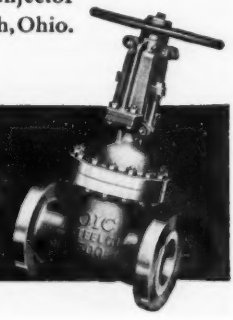
¼-inch to 2-inches
600 primary pressure series.

CAST STEEL

2 inches to 16 inches
150, 300 and 600 primary pressure series.

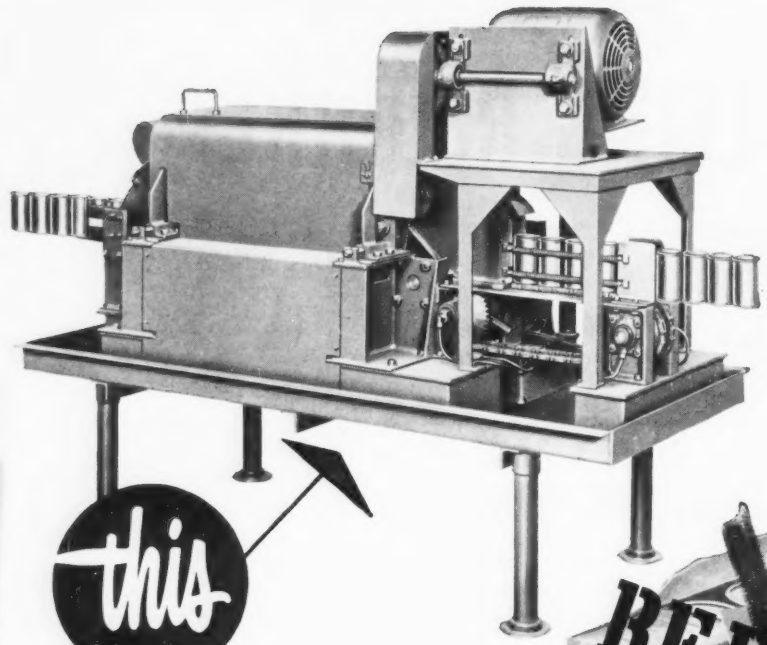
Screwed, flanged, butt weld and socket weld ends . . . rising and non-rising stems . . . outside screw and yoke . . . alloy metal seats, discs and wedges, composition discs . . . union, inside screw and bolted bonnet . . . tapered and parallel seat wedges.

If you're needing valve application know-how, call the nearby OIC distributor or write direct to us. The Ohio Injector Company, Wadsworth, Ohio.



VALVES

FORGED AND CAST STEEL • IRON • BRONZE



this

helps avoid this

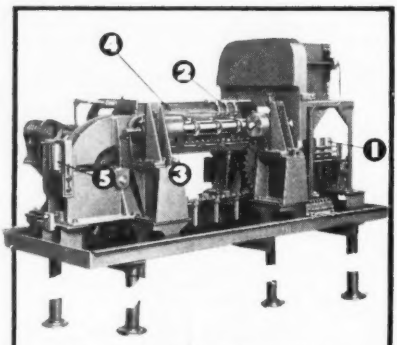
Ever had a shipment rejected because of rusty, unsightly cans or missing labels? There's an easy way to avoid this expensive experience. Just install a Rex Can Cleaner and Drier in your processing line between the cookers and labelers.

This new machine gives your cans a fast, thorough cleaning and drying, speeds them on their way in perfect condition for labeling and packing. A high speed rotary brush removes any dirt, rust or food particles that may be clinging to can sides . . . assures a clean, attractive package for your product.

There are no production delays with the Rex Can Cleaner. Speeds up to 300 cans per minute are possible. Long air drying conveyor lines are eliminated. Labels adhere better to clean, dry cans.

Why not investigate the ways the Rex Can Cleaner and Drier can save money for you? Our bulletin 49-40 contains the complete story. Write for it today or call your nearest Chain Belt Branch office.

Chain Belt Company, 1616 W. Bruce Street, Milwaukee 4, Wisconsin.



Here's a cutaway view of the Rex Can Cleaner and Drier. Cans enter at 1, are spaced by timing worm, and washed (if desired) by Rex Flat Spray Nozzles 2. Adjustable rubber backup roller 3 holds cans against durable, high speed rotary brush 4 for complete cleaning and drying. Cans are returned to upright position and dropped on to next conveyor 5.

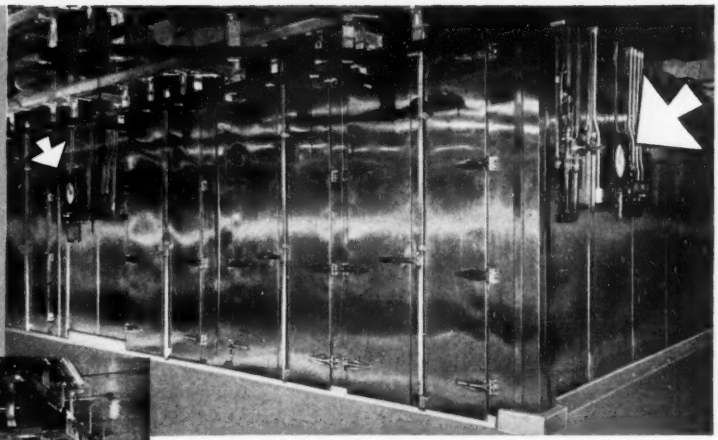
CHAIN BELT REX COMPANY

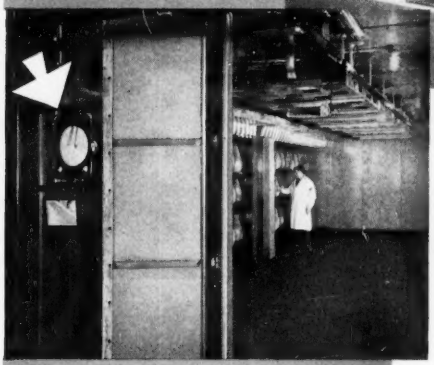
FOOD PROCESSING EQUIPMENT

BOSTON SAUSAGE & PROVISION CO.
Boston, Mass.

Honor Maid
EST. 1919

Trade Mark of Quality Products
For many years Powers controls have been used by this successful firm.





A. Jurkiewicz, plant superintendent, is shown above testing internal temperature of hams that have been showered immediately after smoking. Temperature variations throughout the house are very small.

Battery of ATMOS Stainless Steel Smokehouses at BOSTON SAUSAGE & PROVISION CO.

Automatically Regulated by

POWERS

AIR CONDITIONING CONTROL

Better Quality Products—Lower Labor Costs

assured by these modern smoke houses

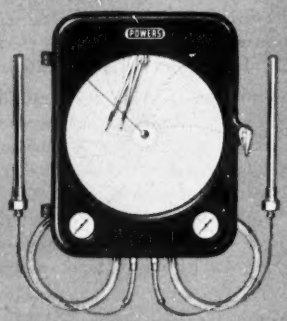
√ *Check these advantages:* **Complete processing within the smoke house; facilities for washing treed meats immediately after smoking; stainless steel surfaces for rapid house cleaning after each smoke operation; two to three degrees range of temperature *throughout the house*, resulting in controlled temperature recording with variations of less than 1°F.**

Powers smoke house temperature control dates back to World War I when our simple self-operating regulators were widely used on AIROBLAST gas-fired units. Now with a complete line of time tested pneumatic controls for every requirement of modern smoke houses, you can always rely on those regulated by POWERS.

When you want dependable temperature control for any of the following processes or operations:

Large Water Heaters • Booster Heaters for Sterilizing • Hog Scalding Vats and De-hairing Machines • Cooking Vats, Kettles and Sausage Steaming Cabinets • Smoke Houses • Drying, Curing and Chilling Rooms • Slicing and Packaging Rooms — and Many Processes in By-Product Plants.

... please phone or write our nearest office. There's no obligation.



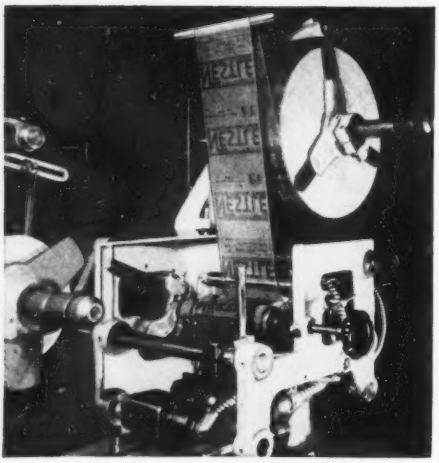
POWERS WET AND DRY BULB TEMPERATURE RECORDING REGULATOR
Special duct mounting flanges for bulbs are available for smoke house applications

Also Available
TIME CYCLE RECORDING REGULATORS
INDICATING REGULATORS
Self-Operated and Air-Operated
POWERS FAMOUS FLOWRITE DIAPHRAGM VALVES
DIAL INDICATING and RECORDING THERMOMETERS
THERMOSTATS and HYGROSTATS for Heating and Air Conditioning Systems

THE POWERS REGULATOR CO.

Established 1891 • OFFICES IN OVER 50 CITIES • See Your Phone Book
CHICAGO 14, ILL., 2793 Greenview Ave. • NEW YORK 17, N.Y., 231 E. 46th St.
LOS ANGELES 5, CAL., 1808 West 8th St. • TORONTO, ONT., 195 Spadina Ave.
MEXICO, D. F., Edificio "La Nacional" 601 (SHA)

faster packaging, hairline register, and less waste!



SAVES WRAPPING MATERIAL!

At the Peter Cailler Kohler Swiss Chocolate Co. plant in Fulton, N. Y., Nestle chocolate bars are quickly wrapped in this packaging machine. Here, G-E cut-off register control has meant a big saving in wrapping material, plus an increased production rate, over the mechanical method previously used, which often wasted material through poor register and periodic jams.

G-E register controls—cut-off, side, and color—boost packaging speed, maintain pin-point accuracy, cut waste due to rejects!

In these days of self-service retailing, your product's "buy-appeal" is far greater when you package it in a neat, attractive wrapper—precision printed and cut with General Electric register controls. Automatic in operation, these electronic aids for food packaging also give you these advantages:

Increased production through automatic operation and higher machine speeds. *Lower material and labor costs* which often justify the equipment's entire cost. *Low maintenance* due to few moving parts, with automatically-maintained register eliminating need for constant visual inspection. *Easy operation* that requires no special training, enables operators to devote more time to other duties. *Maximum flexibility,* permitting controls to work equally well on paper, cellophane, metal foil, or cloth.

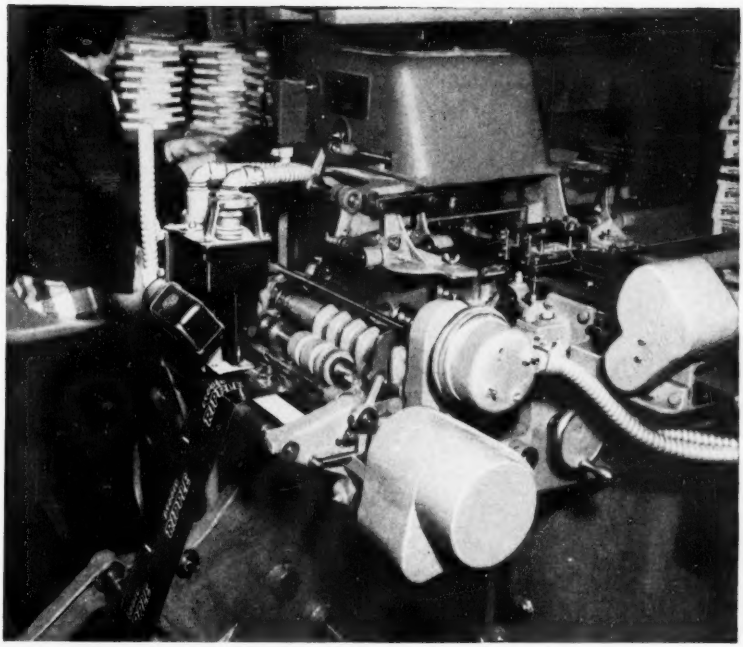
Use *cut-off register control* for your wrapping operations, *side-register control* for your slitters or wherever the web must be guided, and, if you do your own printing, *color-register control* for your web-fed gravure or offset presses. Ask your G-E food industry specialist how to apply these G-E register controls to boost output, cut costs in packaging *your* food products. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

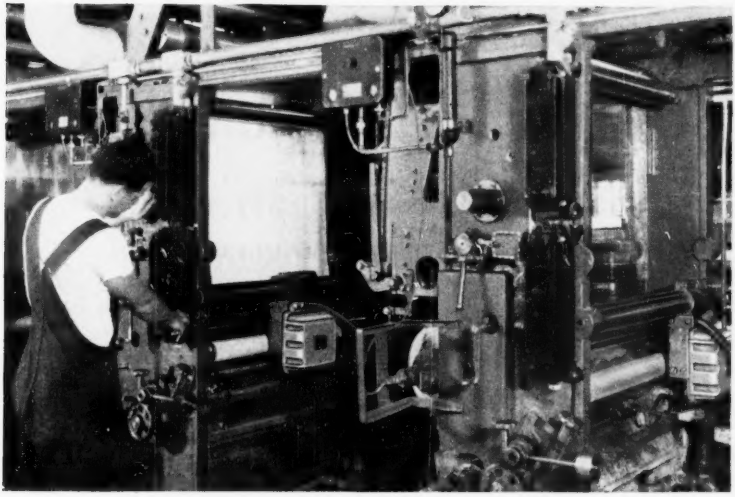
GENERAL ELECTRIC

652-7

SAVES MANHOURS!

Where eight people were once needed at the Golden Nugget Sweets, Ltd., plant in San Francisco to hand wrap and box candy bars, only two have been needed since the installation of a wrapping machine with G-E cut-off register control. Since register is maintained automatically, the control eliminates the need for constant visual inspection. Moreover, it permits wrapping as many as 115 candy bars per minute while cutting the preprinted paper roll to exact lengths and precisely positioning the printed design. Electronically controlled, this G-E device has few wearing parts, requires but little maintenance.





SAVES PRODUCTION TIME!

At Milprint, Inc., in Milwaukee, which prints multi-color wrappers on a continuous roll for use by food packers, G-E color-register control has permitted a substantial increase in press speeds. Close register is held on this rotary gravure press even on such difficult materials as cellophane, pliofilm, and cellulose acetate. As a result, this company calculates the saving in rejects will more than pay for the G-E equipment within a year.

GE

REGISTER CONTROLS for food packers

TRAILMOBILE ANNOUNCES NEW Model A Trailer to Meet Today's Rigid Requirements

Lightweight Model A offers increased strength for "round-the-clock" duty with minimum maintenance!

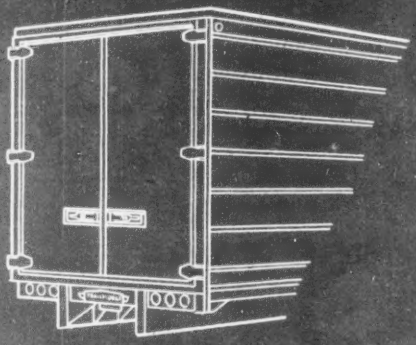
Trailmobile's new aluminum trailer meets today's need for a lightweight unit that can take it! Model A is advance-designed throughout with 15 "years-ahead" features. All vital points of strain are reinforced to take grueling 24-hour-per-day service—yet require a bare minimum of maintenance.

Check these Model A specifications point by point, feature by feature. You will find every construction feature which your own practical day by day experience proves is needed to meet today's conditions, necessary for keeping your trailers on the road. And only in this new Trailmobile will you find extra service so carefully engineered into the trailer providing long life and safety. Truly, here is the new type trailer that today's times demand.

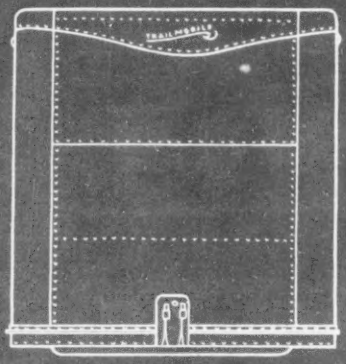
WRITE TODAY FOR DETAILED INFORMATION

T R A I L M O B I L E

31st & Robertson, Cincinnati 9, Ohio • Berkeley 2, California

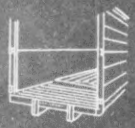


REAR END DESIGN OFFERS MAXIMUM PROTECTION AGAINST LOADING DOCK DAMAGE. NEW DOORS GIVE GREATER RIGIDITY AND POSITIVE WEATHER PROTECTION.



NEWLY DESIGNED TRAILER NOSE IMPROVES APPEARANCE... INCREASES LOADING AREA.

MODEL A OFFERS 15 "YEARS-AHEAD" FEATURES THAT HAULERS WANT MOST!



1-1/16" T & G FIR ON 12" BOLSTER SPACING WILL SAFELY SUPPORT LIFT TRUCK FRONT AXLE LOADINGS OF 10,500 LBS.—YET WEIGHS ONLY 3.19 LBS. PER SQ. FT.

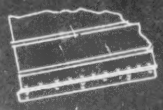
THICK, EXTRUDED ALUMINUM RAIL AT BOTTOM...INTEGRAL DRIP MOLDING AT TOP PROTECTS SIDE PANELS AND LIGHTS FROM DAMAGE.

FOUR DIE-FORMED STEEL BUMPERS, INTERNALLY REINFORCED, PLUS STEEL TAILSHELF PROTECTS REAR. LIGHTS AND REFLECTORS ARE RECESSED FOR PROTECTION.

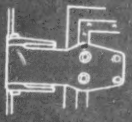
IMPROVED NEW TYPE RUBBER RADIUS ROD BUSHING HAS METAL SLEEVE TO PERMIT EASY REPLACEMENT OF RADIUS ROD PIN.

POSITIVE, QUICK, SAFE BRAKING ACTION, RECOGNIZED AS THE SAFEST BRAKE IN THE INDUSTRY.

DENT-RESISTING REAR ROOF MEMBER IS INTERNALLY REINFORCED. DRIP MOLDING IS AN INTEGRAL PART OF ROOF MEMBER.



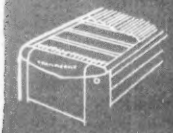
ALCLAD SIDE PANELS RESIST CORROSION...REMAIN BRIGHT...CAN BE REPLACED WITHOUT REMOVING RUB RAIL.



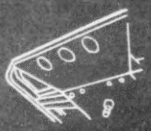
CLOSE FITTING HINGE BUTTS PROTECTED BY BUMPERS. STURDY HINGES SECURELY FASTENED TO DOOR FRAME —EASILY REPLACED WITHOUT DISASSEMBLING DOOR.

ONLY 2 MOVING PARTS IN TANDEM UNIT...LESS MAINTENANCE...BALANCED BRAKE ACTION...LESS WEAR ...LONGER BRAKE LIFE.

TUBULAR AXLE RESISTS STRAIN FROM EVERY DIRECTION. TAPERED ALLOY STEEL SPINDLES.



NEW ROOF BOWS HAVE 60% GREATER RESISTANCE TO DEFLECTION. ROOF SHEETS RIBBED FOR GREATER STRENGTH.

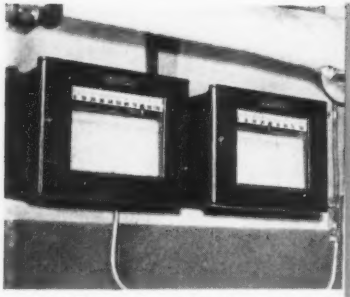


5/16" UPPER FIFTH WHEEL PLATE ELIMINATES BUCKLING...PROVIDES STRONGER MOUNTING FOR KING PIN.

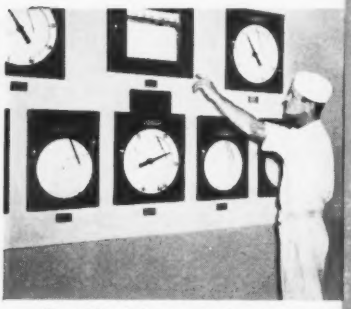
EXTRUDED ALUMINUM DOOR FRAMES, FLASH WELDED AT CORNERS FOR GREATER RIGIDITY. WEATHERPROOF SEAL IN EXTRUDED SLAM STRIP SEALS OUT MOISTURE, DUST.

INVERTED LANDING GEAR SCREW AND NUT OPERATE IN CONSTANT BATH OF OIL... REDUCES FRICTION. 2-SPEED GEAR BOX SAVES TIME AND EFFORT.

SILICO MANGANESE SPRINGS. WIDER SPRING LEAVES GIVE GREATER BEARING AREA. SPRINGS ROLL IN HANGERS TO AVOID EXCESS WEAR.

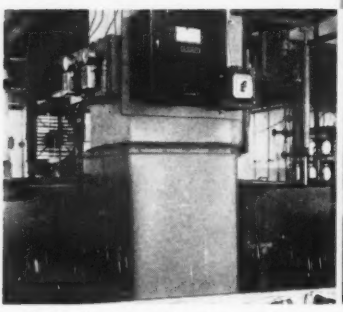


Recording candy making temperatures.
Photo courtesy of Loft Candy Co.

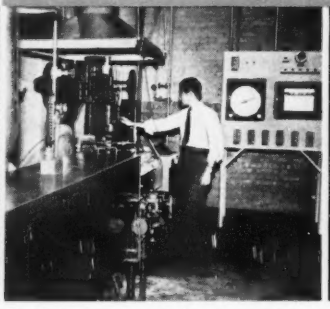


Recording bake oven temperatures.
Photo courtesy of Fuchs Baking Co.

READY SOLUTIONS FOR YOUR TEMPERATURE MEASURING PROBLEMS



Indicating ham boiling temperatures.
Photo courtesy of Wm. Schluderburg—T. G. Kurdle Co.



Recording aseptic canning temperatures.
Photo courtesy of The Borden Co.

Recording brewery process temperatures.
Photo courtesy of Blitz-Weinhard Brewing Co.

THE easy adaptability of *ElectroniK* instruments for use with specially-designed temperature measuring tools...plus our experience and know-how in applying them... are setting higher production and quality standards in a variety of Food processes.

Typical are the installations pictured here . . . *ElectroniK* indicating or recording for sausage smoking, aseptic canning, candy making, baking, ham boiling and brewing.

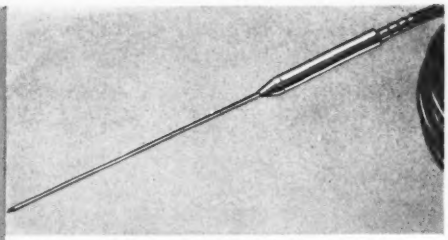
Each process takes full advantage of the flexibility of *ElectroniK* instruments. Through centralization of several temperature readings in one instrument, process supervision is made easier and more effective.

ElectroniK instruments are also used widely to measure other process variables such as pH, conductivity, pressure, flow, density, speed and humidity.

A WHOLE NEW CONCEPT OF INSTRUMENTATION
BASED ON BROWN CONTROL TECHNOLOGY
IS REVOLUTIONIZING THE FOOD INDUSTRY

Engineered to Cut Costs and Increase Production

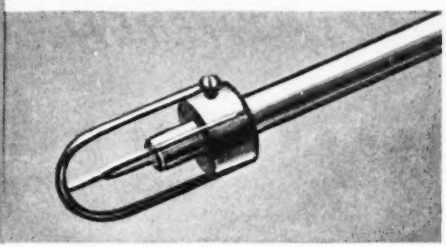
Recording smoke-house temperatures
Photo courtesy of Weiland Packing Co.



Pointed sanitary thermocouple for measuring internal temperature of meat.

Special thermocouple for applications where space is a limitation.

Pencil thermocouple for measuring temperature of milk as received.



Guarded thermocouple for kettles equipped with agitators.

Call in your local Honeywell engineer for a discussion of your process needs today . . . he is as near as your phone. Write for a copy of Data Sheet No. 3.10-2 for detailed information on special temperature measuring elements. MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4502 Wayne Ave., Philadelphia 44, Pa. Offices in more than 80 principal cities of the United States, Canada and throughout the world.

MINNEAPOLIS Honeywell
BROWN INSTRUMENTS

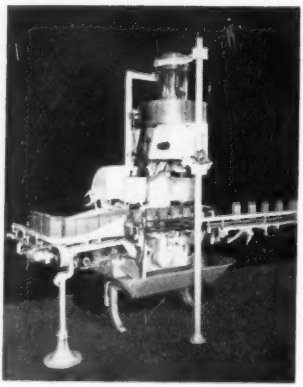
MIXING WITH THE ARISTOCRATS

Pneumatic

PACKAGES THEM ALL

The fourteen "blue chip" brands pictured above represent the cream of the highly popular prepared flour mixes. Each and every one of these famed packages is produced with the help of Pneumatic "lower cost per container" packaging equipment.

PNEUMATIC SCALE CORP., LTD., 91 Newport Ave., Quincy 71, Mass. *Branch Offices: New York; Chicago; San Francisco; Los Angeles; Seattle; Leeds, England.*

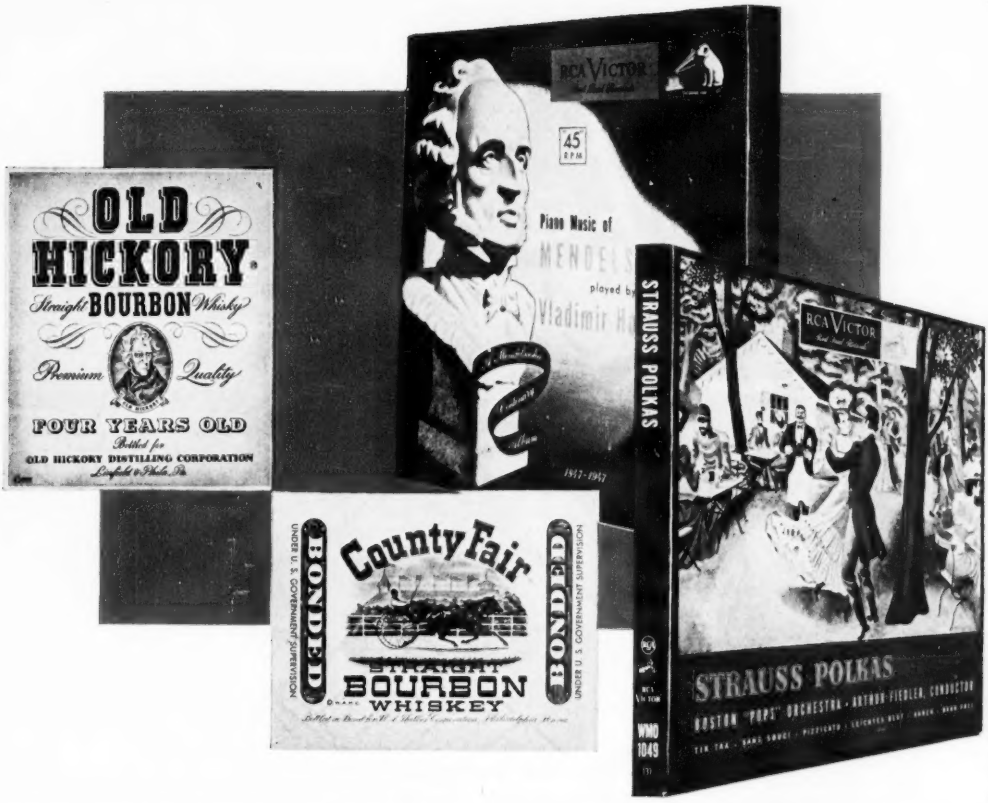


Twin Scale Cone Feed Weigher — specially designed unit for handling prepared flour mixes.

SEE OUR EXHIBIT • Booth 333, National Packaging Exposition, Atlantic City • April 17-20

PNEUMATIC
LOWER COST PER CONTAINER

PACKAGING AND BOTTLING MACHINERY



FOR BRIGHTER, CLEANER, BETTER PROTECTED LABELS

Coat Them with VINYLITE Brand Resins!

Coatings based on VINYLITE Brand Resins protect your labels, trademarks, packages, long after your products leave your hands—at no extra cost to you!

Besides protecting, they make printing brighter and cleaner, and virtually armor it against smudging, scuffing, and abrasion.

Paper, cardboard, foil — coated with VINYLITE Resins—takes on the qualities of these resins, including resistance to water, dampness, alcohols, oils, greases, alkalies, and most strong acids. Available in a host of colors, either transparent or translucent, they are readily heat-sealable. Highly flexible, they neither crack, chip, nor peel off. They increase the tensile, bursting, and tear strengths of label materials, and do not decrease the folding endurance.

Easily applied with conventional roller-coat or spray equipment, these remarkable coatings may be force dried or baked. They provide higher gloss and up to eight times the abrasion resistance of comparable high-grade lacquers.

For technical data and a list of representative suppliers of coatings based on VINYLITE Brand Resins, write today to Dept. KE-74.

Data courtesy Gates Engineering Company, P. O. Box 1711, Wilmington, Delaware

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A Division of
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PAPERBOARD • FOLDING

SHIPPING CONTAINERS

Protect FAMOUS PRODUCTS GOING TO MARKET IN MULTICOLOR

GAIR FOLDING CARTONS

Gair Corrugated Containers are so scientifically constructed that they offer the utmost PROTECTION against the many hazards of shipping . . . truly amazing how they withstand tremendous knocking about and rough usage . . . always dependable PROTECTION for cartons and contents.

Gair Containers and Gair Cartons both possess powerful advertising and selling features . . . a great stimulus to impulse buying which is a potent factor in today's SELF-SERVICE selling.

Reach a new sales peak this year . . . move ahead of competition . . . increase the prestige of your product with the SELL-ON-SIGHT magic of Gair Folding Cartons. Enjoy the shipping PROTECTION of Gair Corrugated Containers.

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WRITE TODAY for samples and technical information

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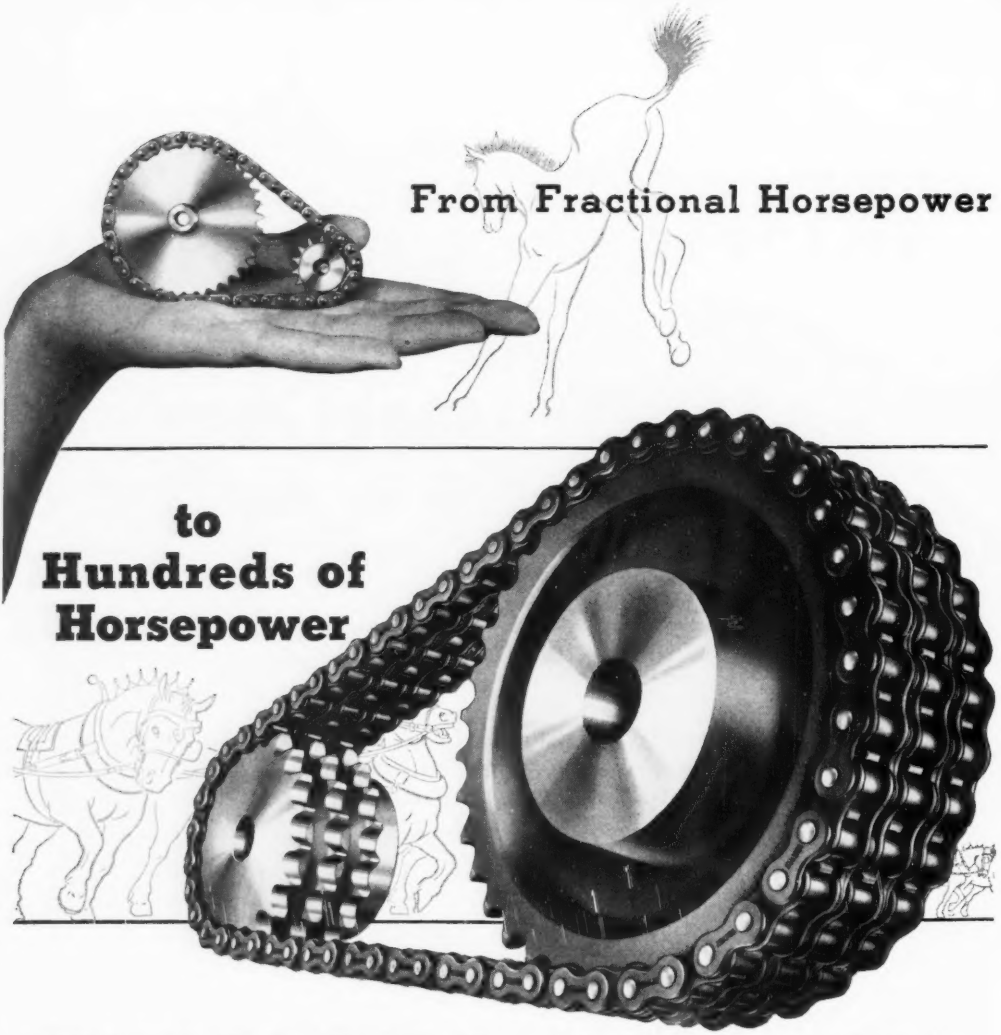
CARTONS • SHIPPING CONTAINERS



Whitney Chain Drives Simplify Design—Cut Costs

No matter what your drive problem, be it small movie cameras, machine tools or earth movers, you will find a Whitney Chain Drive to fill the application exactly.

And what's more, these adaptable drives offer opportunities for important cost reductions and improved performance. *For example* — Whitney Chain Drives operate equally well on long or short centers. They will drive single or multiple shafts, provide accurate timing or reversal of direction. Standard attachments, built into the chain, offer still more opportunities for economical application possibilities.

And remember, Whitney Chains . . . *the all-steel drives* . . . deliver *full rated* power, smoothly and dependably. Their positive grip transmits constant, uniform speed. They are easily and quickly installed, reducing costly down time. No removal of shafts or bearings necessary. Alloy steel construction assures maximum service with minimum maintenance.

WHITNEY ENGINEERING SERVICE — In addition to the service facilities of more than 130 Distributors, Whitney maintains a network of 15 Field Engineering Offices, located throughout the country. From the complete line of Roller, Silent and Conveyor chains, Whitney engineers can recommend the proper type of drive for your application . . . the chain drive which will give you the best service at lowest cost. Consult your nearest Whitney field office or write us direct for catalog and complete information.

WHITNEY CHAIN COMPANY

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Accurate Measurement is So Easy with NEPTUNE METERS

Neptune Meters are made for men who are hard-boiled about profits and losses in liquid processing operations. Accurate Neptunes substitute unerring precision for the element of human error. They stop spoilage, spillage, and underfilling. They work fast—no slow weighing or batch tanks. Fine-instrument accuracy gives you constant control over product quality—and also keeps close watch over inventory.

They boost good house-keeping, too. Simple, easy to clean, they keep messy or hazardous liquids inside the pipe. Many types now available for handling more than 100 different liquids—including the new "432" push-button Auto-Stop for automatically feeding water and liquid sweeteners to batching or blending. Composition bronze. Sizes ⅝" to 6", for rates to 600 gpm. Easy to read, easy to operate, easy to calibrate, and easy to service with interchangeable parts. For quick facts, just use the coupon. Or phone the nearest Neptune branch.

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Company.....

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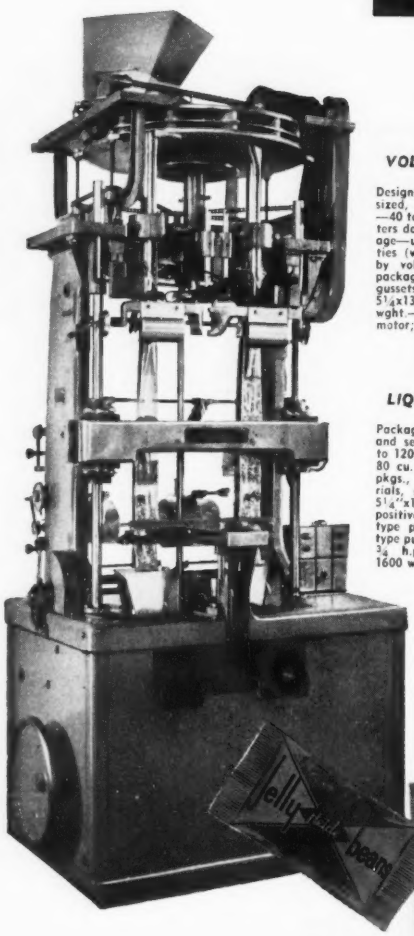
A partial list of the many products for which Transwrap AUTOMATICALLY gives you a better-selling package — at less than half the cost . . .

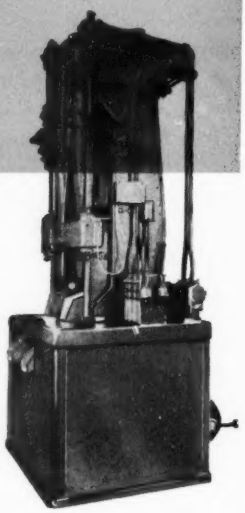
Hard candy
Mincemeat
Coffee
Tea
Extracts
Powders, all types
Paints
Nuts, bolts, etc.
Dried & dehydrated vegetables
Preserves, jams, jellies, fruit butters
Pickles (small)
Ketchup (small packages)
Salad dressings
Mustard (indiv. portions)
Sauces
Horse radish
Cocoa
Nuts
Popcorn
Cocoa butter
Rice
Soup mix, (dry)
Lard
Cheese (creams, pastes, etc.)
Dried milk
Ice cream mix
Sugar
Small plastic novelties
Flavoring agents
Pine nuts
Small pretzels
Cough drops
Chiclets
Seeds
Frosted Foods
Dried dog food
Safety pins
Cranberries
Pills
Tablets
Plastics
Small elbow macaroni
Oleomargarine
Shortening
Gelatin—dry
Tapioca
Grits
Prepared desserts
Peanut butter
Malted milk
Small crackers

TRANSWRAP



VOLUMETRIC UNIT
at left

Designed to package larger-sized, free-flowing products —40 to 75 units per min. Meters down to 1 item per package—up to unlimited quantities (within 80 cu. in.). Fed by volumetric cups. Pillow packages—with or without gussets . . . 1-13/16"x3" to 5¼"x13". Size—4'x5'x8½'; wght.—2330; ¾ h.p. geared motor; 1640 volts.



LIQUID FEED UNIT
at right

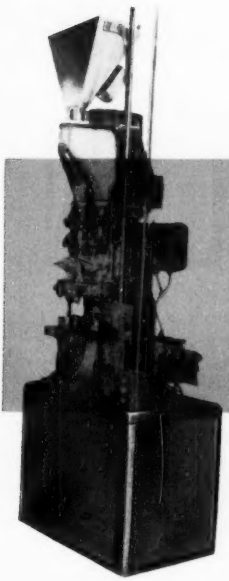
Packages all types of liquids and semi-liquids. Output 40 to 120 per min.—5 cu. in. to 80 cu. in.; pillow or fin-seal pkgs., all heat-sealing materials, sizes—1-13/16"x3" to 5¼"x13". Pressure feed by positive displacement piston type pump, or small Bosch-type pump. 4'x5'x8; 2150 lbs.; ¾ h.p. motors, full load 1600 w.

Transwrap's economy-packaging is not limited to these products . . . we list these merely as an indication of Transwrap's versatility—and a guide to your planning. Submit your product—any product . . . we'll be glad to assist you with your packaging problems.

Beat Your Packaging Problems Today!

• For everyday civilian sales—

• For government contract packaging



Transwrap's fully automatic, high-speed packaging of your product is the answer to your 3 big critical shortages . . .

Manpower

Transwraps are *fully* automatic. One unit exceeds the output of 15 to 18 hand workers; and 2 operators can handle 10 Transwraps. This means you can increase your production per man-hour as much as 90 times!

Time

One Transwrap can automatically *form, fill, seal and deliver* 216,000 packages in an around-the-clock, 24-hr performance! This high-speed dependability is why more Transwraps were used in WW2 govt packaging—and are again, in today's emergency.

Material

Save on both bag and product wastage. Transwraps use economical roll materials; eliminate wasteful puckering, distortion and gumming of bags; insure extra-fine precision measuring; minimize expensive breakage of fragile products. All this adds up to CUTTING DOWN YOUR PACKAGING COSTS! Tremendous savings on labor—and stretching out critical manpower! Eliminate high cost of ready-made bags! Reduce material wastage—and breakage! Cut maintenance costs! *PLUS* complete assurance of avoiding costly contract overtime penalties!

Remember, too—Transwrap actually gives you a better *package . . . smarter-looking, faster-selling. A package* seals in *the fresh flavor and quality of your product—and* seals out *damaging air, vapors and moisture. You can't afford not to investigate Transwrap for your packaging economy.*

Do it today—now!

AUGER UNIT

Ideal for contract packaging. Output 60 to 150 per min.—5 cu. in. to 20 cu. in.; 1¼"x1¼" to 2⅜"x6½". Feeds by auger-type screw, from hopper reservoir. Pillow-type package, with or without gusset—all heat-sealing materials. Equipped with photo-electric control. 4'x4'x8'; wght, 1951 lbs.; two-½ h.p. motors, total load, 1582 w.

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Announcing

CRYSTALLINE

available in stabilized, high potency, dry granular form and as a liquid palmitate derivative

For the first time in history, crystalline Vitamin A, has been produced by synthesis *on a commercial scale.*

No longer is it necessary to tolerate the extraneous materials found in previous natural and synthetic products. All the important advantages of the pure crystalline material are now available in unrestricted volume in these new Pfizer products:

STABILIZED CRYSTALLINE VITAMIN A ACETATE

A dry product of exceptional stability which can be handled, measured and stored under all normal conditions. Insensitive to oxidation or humidity, *Stabilized Crystalline Vitamin A Acetate* fills a long felt need for a dry, high-potency product which can be used in the manufacture of Vitamin A tablets, in the fortification of foods and in the preparation of other dry products, without fear of deterioration.

VITAMIN A PALMITATE

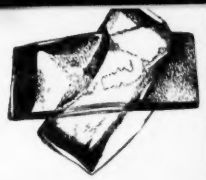
Derived from pure Crystalline Vitamin A Acetate, the outstanding purity and high potency of this product make it ideal for use in oil solutions and aqueous dispersions. It is also particularly suited to the fortification of milk and other liquid food products where taste is a factor.

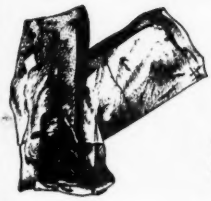
WRITE OR PHONE FOR COMPLETE DETAILS

These new Crystalline Vitamin A derivatives make possible higher quality products than ever before attainable and open the way for many new applications. Write for samples, prices and technical data.

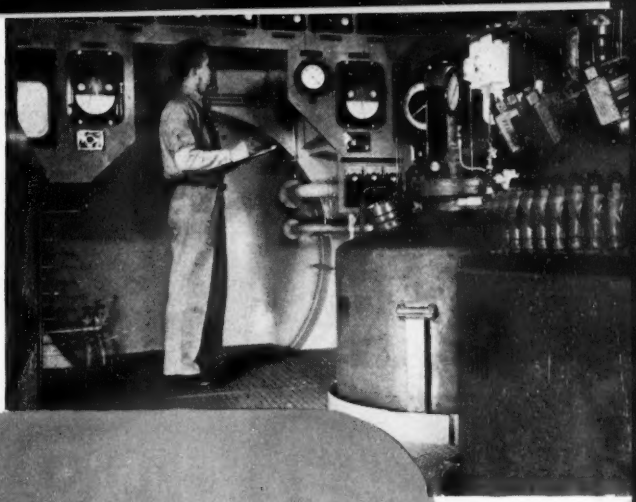
STABILIZED CRYSTALLINE VITAMIN A ACETATE	**Physical Characteristics** — Finely divided dry powder, light yellow color, practically odorless and tasteless. **Potency** — Standardized at 500,000 U.S.P. units per gram. **Purity** — Derived from Crystalline Vitamin A Acetate, the only pure form of this vitamin commercially produced. **Packaging** — Packaged in standard amber glass, screw type bottles and in drums.
VITAMIN A PALMITATE	**Physical Characteristics** — Liquid — yellow color, practically odorless and tasteless. **Potency*** — Not less than 1,600,000 U.S.P. units per gram. **Purity** — Derived from pure Crystalline Vitamin A Acetate, it has a purity of 90-95%. **Packaging** — Packed in aluminum bottles under nitrogen.

*Also available in oil solution at a potency of 1,000,000 U.S.P. units per gram.





Control instruments and equipment in continuous process manufacture of Vitamin A.



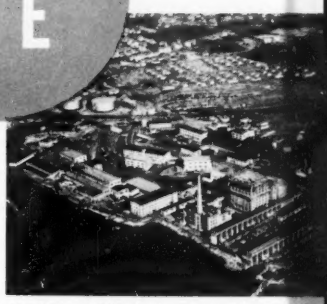
VITAMIN A ACETATE

now being produced in commercial quantity

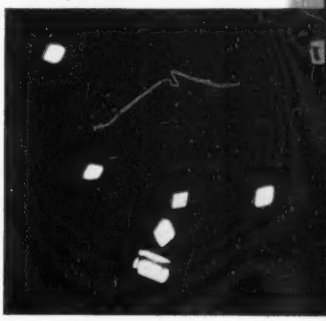
The large new Pfizer installations at Groton, Conn., provide unrivaled facilities for the manufacture of vitamins. Here Pfizer has installed the latest developments in modern equipment utilizing the most advanced techniques.

The continually expanding activities of Pfizer's highly skilled technical staff promise unceasing pioneering in the pharmaceutical fields of vitamins, antibiotics, organics and inorganics.

Investigate the potentialities made possible by using this new pure form of Vitamin A in your products.



Air view of Pfizer's huge new plant at Groton, Conn., in which Crystalline Vitamin A is produced.



Photomicrograph of crystals of synthesized Vitamin A.

MAIL COUPON FOR TECHNICAL DATA

Pfizer

Manufacturing Chemists for Over 100 Years

Chas. Pfizer & Co., Inc., 630 Flushing Ave., Brooklyn 6, N. Y.; 425 North Michigan Ave., Chicago 11, Ill.; 605 Third St., San Francisco 7, Calif.; Export Dept. 81 Maiden Lane, New York 38, N. Y.

Chas. Pfizer & Co., Inc., 630 Flushing Ave., Brooklyn 6, N. Y.
Kindly send me Technical Data on Crystalline Vitamin A.

Company.....

Address.....

.....

Type of Business.....

Interested in Vitamin A for:.....

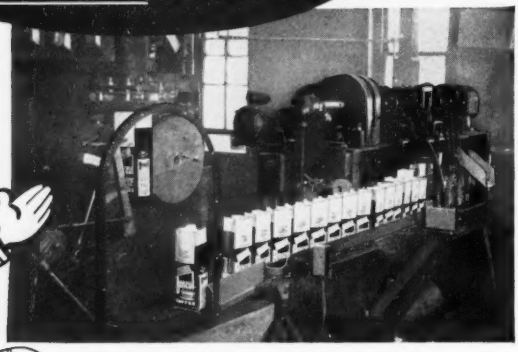
.....

Signed by.....**Position**.....

FOOD PACKERS are learning new tricks from

Kard-O-Pak

A *Flexible* CONTAINER THAT GIVES *Vacuum Pack* PROTECTION



BOSCUL Coffee being automatically filled and sealed in KARD-O-PAK Bags. Wm. S. Scull Co., Camden, N. J.

Strong, heat-welded, hermetically tight plastic enclosure, protects and holds the flavor, aroma, and moisture content of coffee, dehydrated foods, dried milk, dried eggs, dog food, powders, frozen foods, etc.

KARD-O-PAK **patented, self-opening flat bottom enables the bag to stand firm and upright for automatic filling. Now in use on GUMP, CONSOLIDATED, FRY, BENCO and other automatic equipment.**

KARD-O-PAK **provides many of the advantages of vacuum packing or metal containers at a low, paper bag cost. Many famous food products using KARD-O-PAK report**

LOWERED DISTRIBUTION COST • FEWER PRODUCT RETURNS • SAVING IN STORAGE SPACE

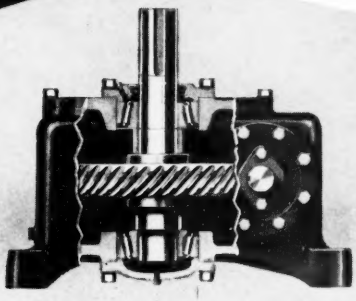
Write for samples and full information

BOSCUL COFFEE *famous for its "locked-in" aroma and freshness, is just one of the many top brand foods packed in* KARD-O-PAK

AMERICAN BAG AND PAPER CORPORATION Water and South Sts. • Philadelphia 47, Penna.

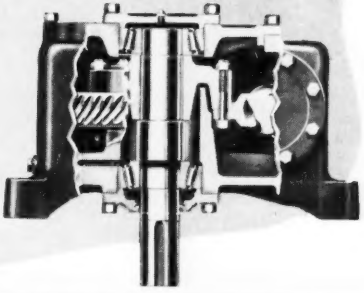
For Agitators, Mixers, And Other Vertical Drive Requirements

EITHER



UP

OR DOWN



PHILADELPHIA WORM GEAR REDUCERS

There's a wide range of applications for these speed reducers where the drive is required vertically. Philadelphia Vertical Worm Gear units may be had with the output shaft extended either up or down. The down driven type is made with a unique dry well construction that makes oil leaks down the vertical shaft impossible. Bearings have a generous spread so these units are readily adapted for heavy side loads. They can be supplied in from 7⅛ to 60:1 and .081 to 262.89 horsepower. The conventional horizontal right angle type also available in the same range of ratios and horsepowers.

Complete details about vertical and horizontal Worm Gear Reducers are in Catalog No. 26. Write for a copy on your Business Letterhead, please.

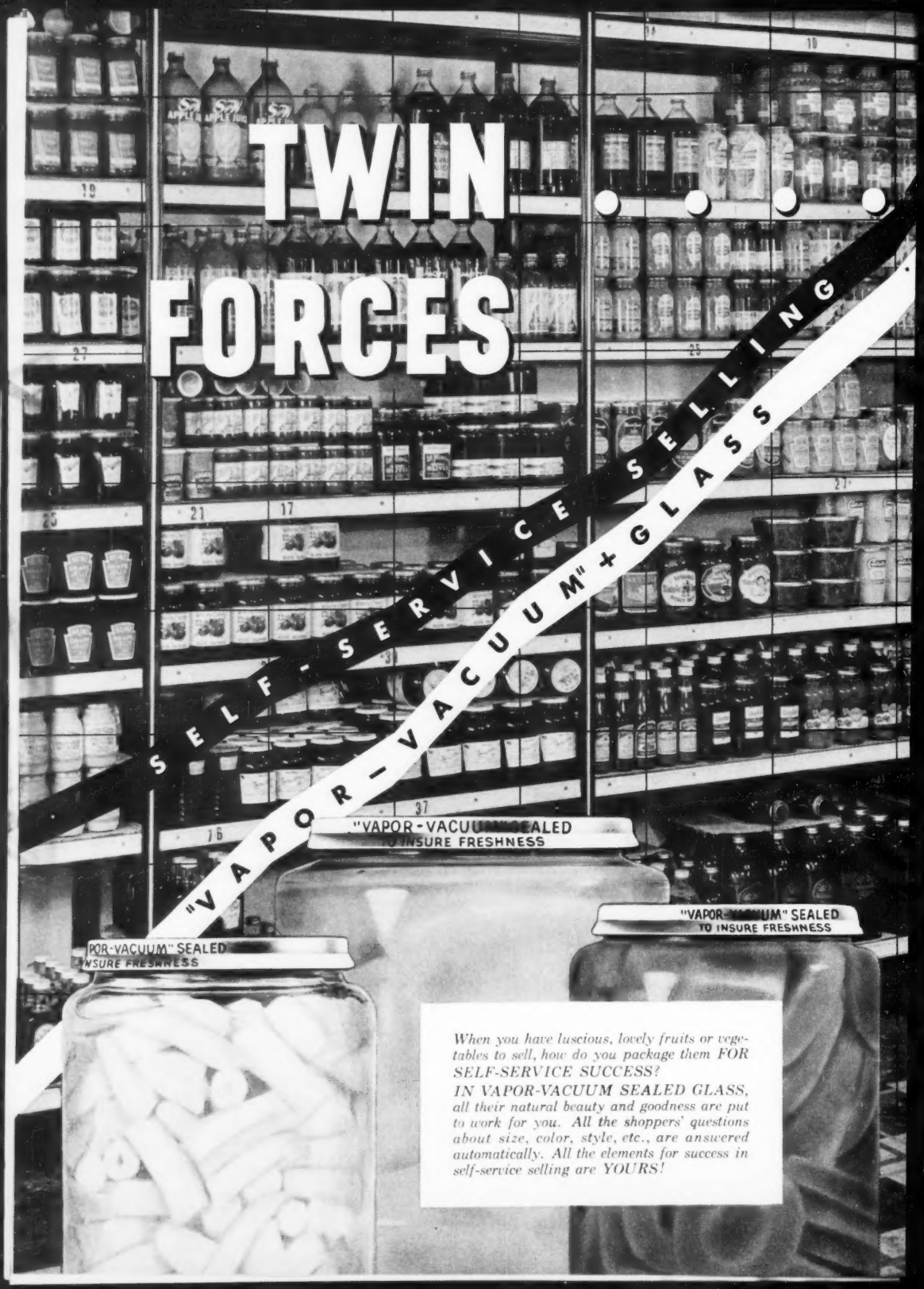
Philadelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK • PITTSBURGH • CHICAGO • HOUSTON

IN CANADA: WILLIAM AND J. G. GREEY LIMITED, TORONTO

Industrial Gears and Speed Reducers
LimiTorque Valve Controls


TWIN FORCES
SELF-SERVICE SELLING
"VAPOR-VACUUM" + GLASS
"VAPOR-VACUUM" SEALED TO INSURE FRESHNESS
"VAPOR-VACUUM" SEALED TO INSURE FRESHNESS
When you have luscious, lovely fruits or vegetables to sell, how do you package them FOR SELF-SERVICE SUCCESS?
IN VAPOR-VACUUM SEALED GLASS, all their natural beauty and goodness are put to work for you. All the shoppers' questions about size, color, style, etc., are answered automatically. All the elements for success in self-service selling are YOURS!

Self-Service and "Vapor-Vacuum"

It's no accident that the history of self-service selling and Vapor-Vacuum Sealing parallel each other so closely.

These two great forces have literally grown up together. Their development and spread have coincided, both in time and in nature.

Self-service entered its great period of growth in the '20s. Vapor-Vacuum Sealed glass, too, began its climb in that decade. As self-service grew, glass with Vapor-Vacuum kept on growing right along with it.

Coincidence? Well, hardly! The twinship of self-service and Vapor-Vacuum is the product of forces which are clearly definable:

Made for each other!

The growth of self-service and of Vapor-Vacuum has been parallel because these two were made for each other—and because they mutually feed each other.

Both have the same foundations, the same reasons for being. Alike, they give the public what it wants: *quick, easy, pleasant shopping with a minimum of risk.* Alike, they provide a mechanism for distributing good foods at low cost. Alike, they satisfy the great American public.

• • •

In the light of this great affinity between self-service merchandising and Vapor-Vacuum packaging, every food packer will do well to keep in mind these facts:

(1) *A glass package with a Vapor-Vacuum Seal fights its own battles as no other package can.* Nothing else on the self-service shelves can speak more loudly, more clearly, nor more persuasively.

(2) *A glass package with a Vapor-Vacuum Seal doesn't need the ministrations of the grocery clerk.* Questions in the shopper's mind are answered automatically.

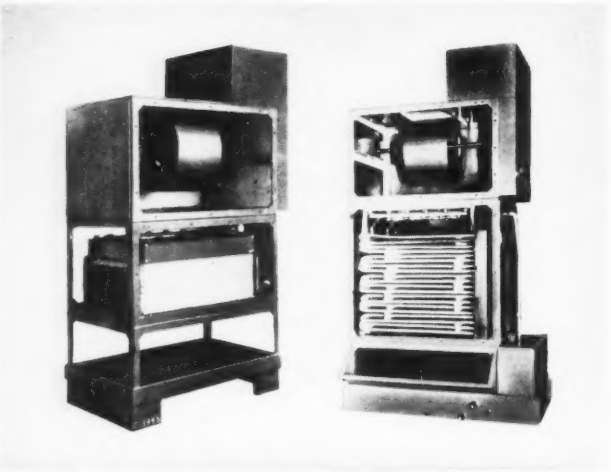
(3) *Impulse buying—the life blood of the self-service store—is powerfully stimulated by Glass with Vapor-Vacuum Seals.* No other type of packaging can match it for ability to spark those sudden buying decisions!

WHITE CAP CO., 1819 N. Major Ave., Chicago 39, Illinois.

"VAPOR-VACUUM"* Seal and Re-Seal

PRODUCT OF **WHITE CAP CO.**, CHICAGO

THEY JUST NATURALLY GREW UP TOGETHER



What Make of Product Cooler Will Do Your Job Best?

Here's where the wide selection of cooling and freezing equipment made by Worthington really pays off.

From the complete Worthington line, you can pick exactly the right unit to meet your specifications of:

- medium or low temperature
- automatic defrosting—periodic or continuous
- capacities from 2 to 37 tons of refrigeration
- air circulation rates from 1600 to 16,000 cfm
- direct air discharge or with ductwork
- various arrangements for air inlet and discharge

Worthington's dry-coil type (UCY) for medium and low temperatures uses ammonia or Freon-12 and may be equipped with automatic water defrost. The recirculating-spray (continuous automatic defrost) type (UCZ) uses ammonia or brine. Five sizes of each type. Finned copper coils for high air-contact efficiency with Freon: prime surface steel coils for ammonia or brine.

Features—quick, uniform flow of cold air throughout, no dead spots . . . automatic operation . . . automatic defrosting . . . sectionalized construction with removable panels . . . forward-curved centrifugal fans for quiet operation . . . surge drum and float valve assembly available . . . pump-motor units (also Worthington-made).

FOR LONGEST LIFE—Copper tubes for Freon, hot-dipped galvanized steel tubes for ammonia and brine . . . Sections fabricated from sturdy No. 11-gauge steel angles electrowelded and reinforced with heavy gussets . . . All-steel cover completely covers motor and drive . . . Large-volume drain pan constructed of galvannealed steel, electrowelded . . . Entire unit, including drain pan, bonderized and covered with a rubber-base enamel, containing corrosion-inhibiting metallic powder.

Write for Bulletin C1100-B35.

A-16

WORTHINGTON

AIR CONDITIONING AND REFRIGERATION

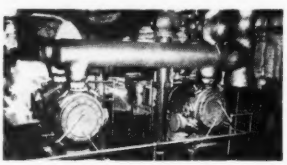
How Cold Do You Want It?

From the complete line of Worthington equipment—all *manufactured*, not just assembled by Worthington—you can get the maximum variety of refrigerating equipment.

Typical of this variety are the following:

John Morrell & Co. plant at Topeka, Kansas

At John Morrell & Co.'s Topeka plant, a Worthington Uniflo horizontal ammonia compressor is completing its tenth year helping to chill and freeze meat products at temperatures ranging from 0 to 60 degrees. This steam-driven compressor was installed in 1940, and is still operating efficiently on around-the-clock service.



Worthington steam-driven ammonia compressor in John Morrell Plant

Worthington refrigeration equipment operated by Coastal Dairy Products

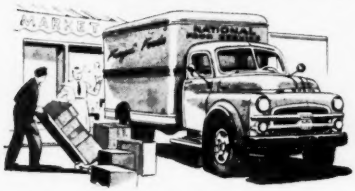
Ice cream is the job handled by Worthington compressors at Coastal Dairy Products, Wilson, N. C. Three vertical ammonia compressors and one ammonia booster compressor are used to pre-cool the mix to 40 F, freeze at about 0 F, and then harden at minus 20 F.

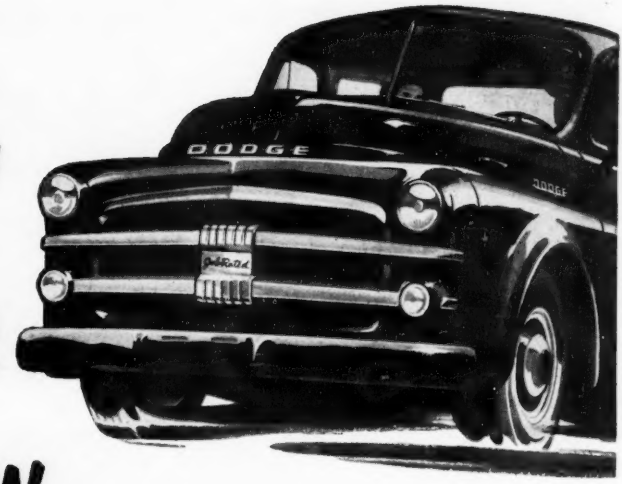
INVESTIGATE

MORE WORTH WITH WORTHINGTON

Consult Classified Telephone Directory for nearest Worthington distributor. Worthington Pump and Machinery Corporation, Air Conditioning and Refrigeration Division, Harrison, N. J., specialists in air conditioning and refrigeration for more than 50 years.

"Job-Rated" for the Frozen Food Industry





Brand new DODGE "Job-Rated" TRUCKS

The trucks that do the most for you!

More than 50 BRAND-NEW improvements . . . including

NEW! SMOOTHER RIDE with new, "Oriflow" shock absorbers—standard equipment on ½-, ¾-, and 1-ton models.

NEW! EASIER LOADING with lower ground-to-floor height—on all models through 2 tons.

NEW! EASIER BAD-WEATHER STARTING with new moistureproof ignition and high-torque starting motor.

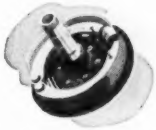
NEW! MORE ECONOMICAL PERFORMANCE with higher (7.0 to 1) compression ratio—on all models through 1 ton.

NEW! SMOOTHER ENGINE IDLING with "hotter" spark plugs; on all models through 1 ton.

BRAND-NEW POWER—You get more power than ever—engineered for *your* job! Eight great engines—with net horsepower stepped up as much as 20%! You get more of the *right* power for your needs—with top economy! Yet, with all their extra value, new Dodge "*Job-Rated*" trucks are priced with the lowest.

BRAND-NEW EASE-OF-HANDLING—You can turn new Dodge "*Job-Rated*" trucks sharper . . . maneuver them more easily. New shorter turning diameters! New worm-and-roller steering gears! All this—plus cross-steering, wide front tread and short wheelbase.

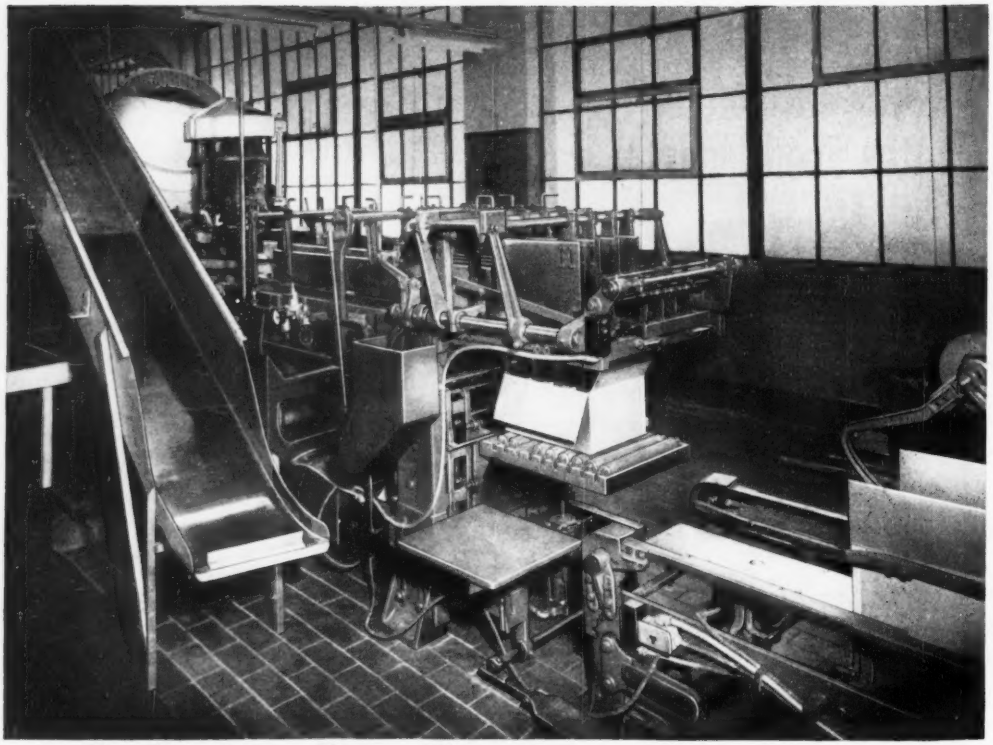
BRAND-NEW BRAKING SAFETY—New Dodge "*Job-Rated*" trucks are the trucks with new molded, tapered Cyclebond brake linings! New *extra-quiet* action! New extra-smooth, extra-sure stopping! New longer lining life! (On new 1½-ton and up trucks, except air brake models.)



PLUS THIS EXCLUSIVE! gyrol Fluid Drive available on ½-, ¾-, and 1-ton, and Route-Van trucks.

See your Dodge Dealer today for

THE TRUCK THAT FITS YOUR JOB... A DODGE "Job-Rated" TRUCK



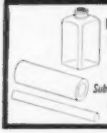
For Packing Glass Containers

Standard-Knapp equipment is high speed, precise and economical. Containers are under complete control throughout the operation. Load forming is automatically regulated to assure a full pack for every case. Damage to containers or cases is eliminated.

Standard-Knapp Bottle Packers are more than equal to the challenge of higher production at lower costs. That is why they are the first choice with leading manufacturers and processors of food, beer, carbonated beverages, and chemicals.

Only the best is

PRODUCTS OF OUR ASSOCIATES INCLUDE:

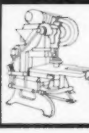


PLASTIC BOTTLES, RODS, TUBES, SPECIAL SHAPES

PLAX CORPORATION

Subsidiary of Hartford-Empire Company

HARTFORD 1, CONNECTICUT

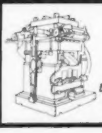


PREMIUM QUALITY STAMPING PRESSES

THE V & O PRESS CO.

Division of Hartford-Empire Company

HUDSON, NEW YORK



HIGH SPEED AUTOMATIC PRESSES

HENRY & WRIGHT

Division of Hartford-Empire Company

HARTFORD 5, CONNECTICUT

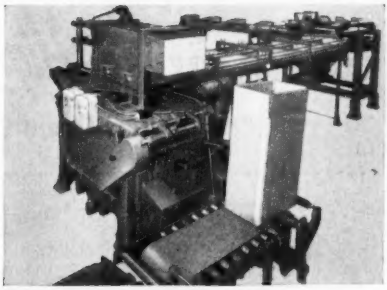
GLASS MAKING MACHINES

GLASS DIVISION

Hartford-Empire Company

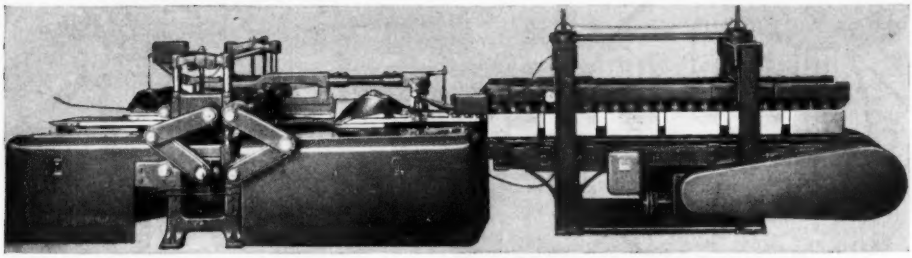
HARTFORD 2, CONNECTICUT

In the field of automatic packaging equipment



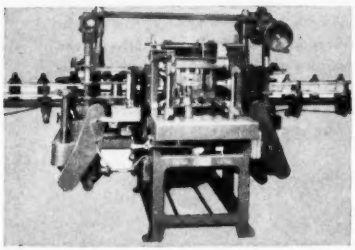
For Packing Cartons

into cases, Standard-Knapp equipment is preferred for its high speed, safe handling and adaptability to varying load patterns. Standard-Knapp Carton Packers are used by foremost manufacturers of soaps, chemicals, cigarettes, pharmaceuticals and cosmetics.



For Glueing and Sealing

shipping cases, Standard-Knapp machines have set the standard of performance for years. If you have heard of gluers and sealers, you have heard of Standard-Knapp.



For Automatic Labeling

of glass and tin containers, it's Standard-Knapp equipment for neat, clean and tight label application. In the food field, where high quality labeling is a must, Standard-Knapp Labelers are preferred.

good enough

STANDARD-KNAPP

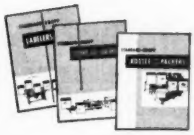
DIVISION OF
HARTFORD-EMPIRE COMPANY

PORTLAND, CONNECTICUT

FACT-PACKED CATALOGS

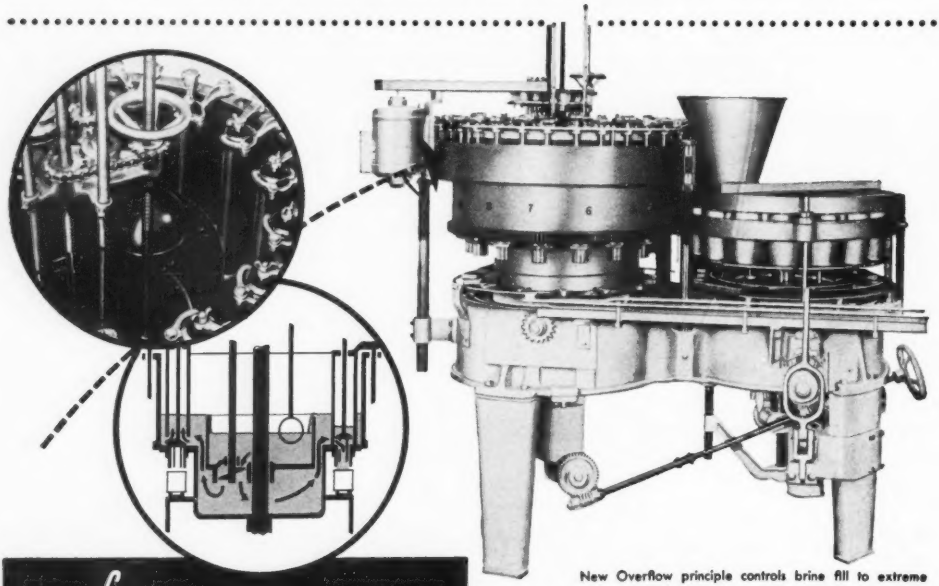
Want to review Standard-Knapp automatic packaging machines in detail? Our catalogs will give you some eye-opening facts.

Please write Dept. F, Standard-Knapp, Portland, Connecticut.



Accurate *High Speed* Filling

of Peas, Whole Grain Corn, Beans and Other Granular Products



the *fmc* 15 STATION FILLER with New Overflow Briner Principle

New Overflow principle controls brine fill to extreme accuracy. A constant liquid level is maintained in the inner tank by means of air-operated controller. Brine pumped to outer tank, at a slightly higher rate than used, provides overflow return to inner tank. Result: brine level in both outer tank and filler valves is held to precision accuracy, cans are filled with the same high precision.

The new FMC 15-Station Filler offers the advantage of two-line capacity in a single machine, without spillage or waste. Designed to operate at speeds as high as 400 cans per minute, depending on can size and conditions, this versatile machine through brine savings alone proves just as economical at speeds down to 150 cans per minute.

Time and money-saving features include: (1) Seperate filling sections for product and brine; (2) "No-can-no-fill" mechanism on both sections; (3) Rotary hopper on product filler for even flow; (4) Banked can track to prevent centrifugal spillage; (5) Straight line takeoff; (6) New briner design (described above) which eliminates costly overfilling.

OTHER FMC FILLING EQUIPMENT

- FMC 8 Station Filler
- FMC 30 Pocket M & S Filler
- FMC Frozen Food Carton Filler
- FMC Hand Pack Fillers
- FMC Juice Fillers
- FMC Soup Fillers
- FMC Utility Fillers

Write for full information, or call your nearest FMC representative.

First in Diversified Food Equipment

fmc FOOD MACHINERY AND CHEMICAL CORPORATION

FOOD MACHINERY AND CHEMICAL CORPORATION
Canning Machinery Divisions

General Sales Offices:

EASTERN: HOOPESTON, ILLINOIS **WESTERN:** SAN JOSE 6, CALIFORNIA

THE CARE AND NURSING OF TANK CARS

Water often makes non-corrosive liquids into corrosive ones...keep cars covered

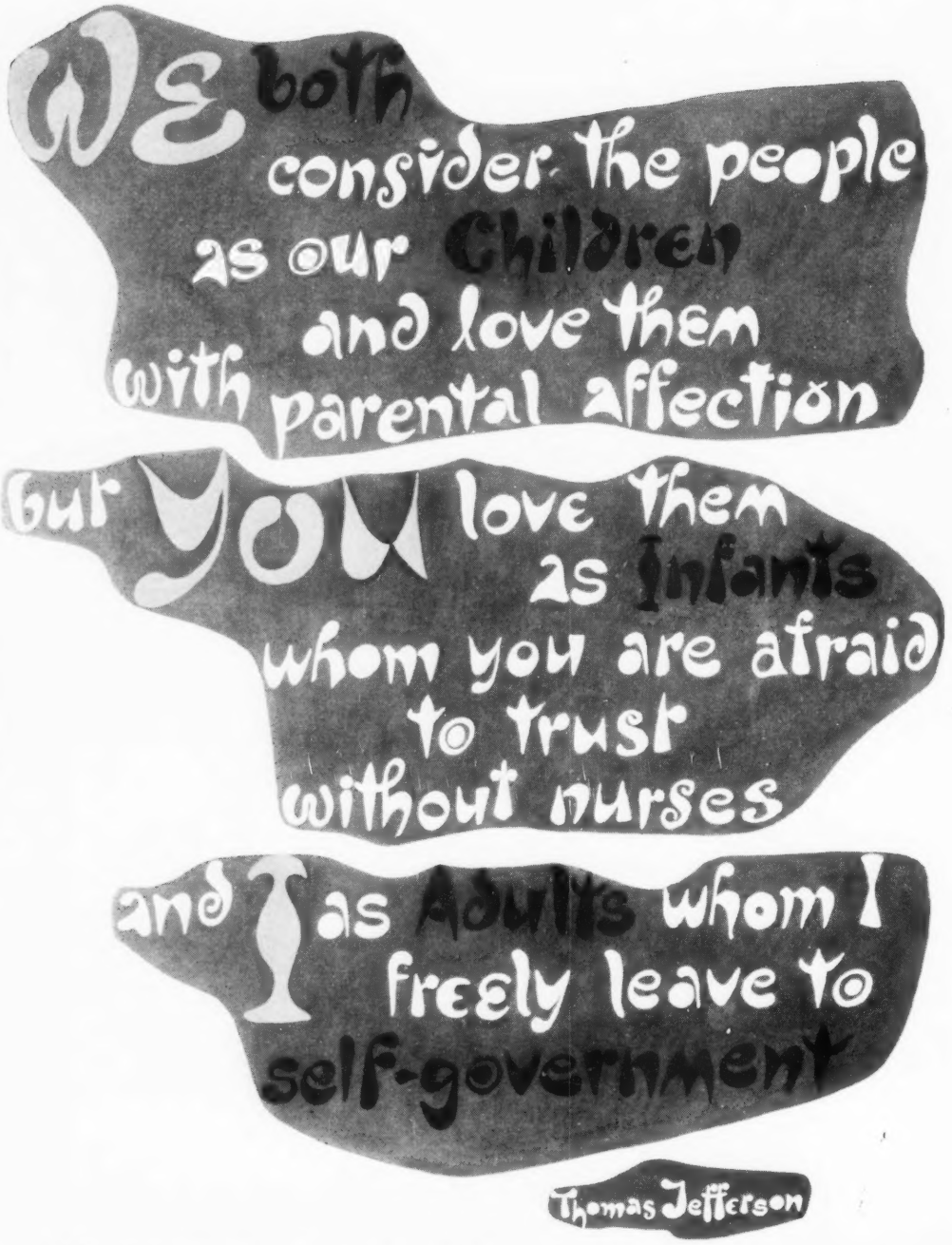
Another way to get more from your GATX tank cars

GATX GENERAL AMERICAN TRADE MARK

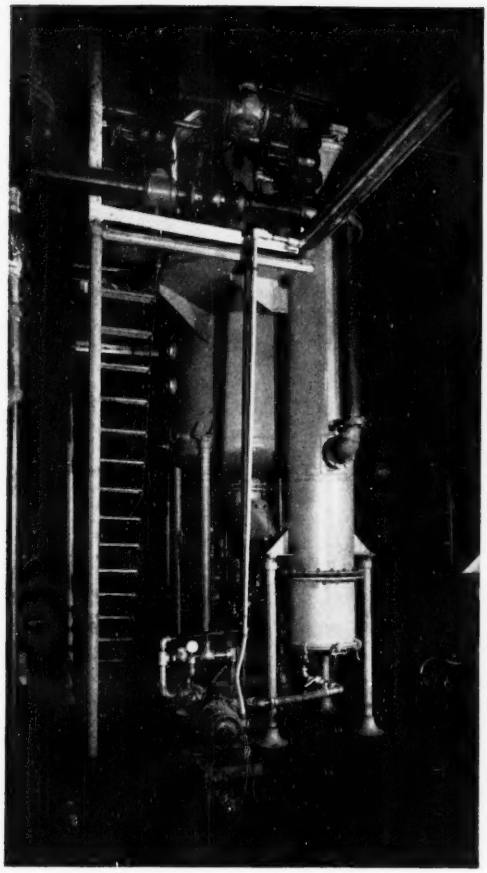
GENERAL AMERICAN TRANSPORTATION CORPORATION
135 South La Salle Street · Chicago 90, Illinois

District Offices: Buffalo • Cleveland • Dallas • Houston • Los Angeles • New Orleans
New York • Pittsburgh • St. Louis • San Francisco • Seattle • Tulsa • Washington
Export Dept.: 10 East 49th Street, New York 17, New York

Artist: herbert bayer


WE both consider the people as our Children and love them with parental affection
but YOU love them as Infants whom you are afraid to trust without nurses
and I as Adults whom I freely leave to self-government
Thomas Jefferson

CONTAINER CORPORATION OF AMERICA



With Pfaudler Vacuum Processing Equipment goes FULL RESPONSIBILITY for desired end results

There is far more involved in building vacuum processing equipment than the mechanics of fabrication. Engineering and experience factors are extremely important. That's why Pfaudler can be so helpful to you when you are in the market for evaporators to process juice concentrates, tomato paste, preserves, jams, jellies, etc.

Pfaudler has engineered, fabricated, installed and helped customers start up *all types* of vacuum evaporators in its long history. Each installation, of course, has required accessory equipment such as condensers, vacuum pumps, valves, piping, etc. All such items are included in any proposal Pfaudler offers. Thus, Pfaudler *assumes full responsibility for desired end results.*

THE INSTALLATION SHOWN, a Pfaudler Vertical Tube Evaporator, was designed for concentrating a fruit juice 3 to 1 at the rate of 1000 gallons per hour. This rate of evaporation has been more than achieved over a period of years. Because it is "delivering" as promised, the over-all investment has proved profitable . . . and that's the "payoff."

In addition to Vertical Tube Evaporators, Pfaudler manufactures Jacketed and Calandrial Types to meet your needs.

FRUIT and JUICE CONCENTRATES are the order of the day because they reduce shipping costs. And vacuum processing preserves their natural characteristics. As specialists in vacuum processing methods, Pfaudler Technicians can offer you valuable help on your processing requirements. To start the ball rolling, sign and return the coupon.

Pfaudler

THE PFAUDLER CO., ROCHESTER 3, NEW YORK
Engineers and Fabricators of Food Processing Equipment

GLASS-LINED STEEL
Hastelloy—Aluminum
Tantalum—Carbon Steel
Solid or Clad Stainless Steel
Nickel, Inconel, Monel

THE PFAUDLER CO., Dept. FI-4, Rochester 3, N. Y.

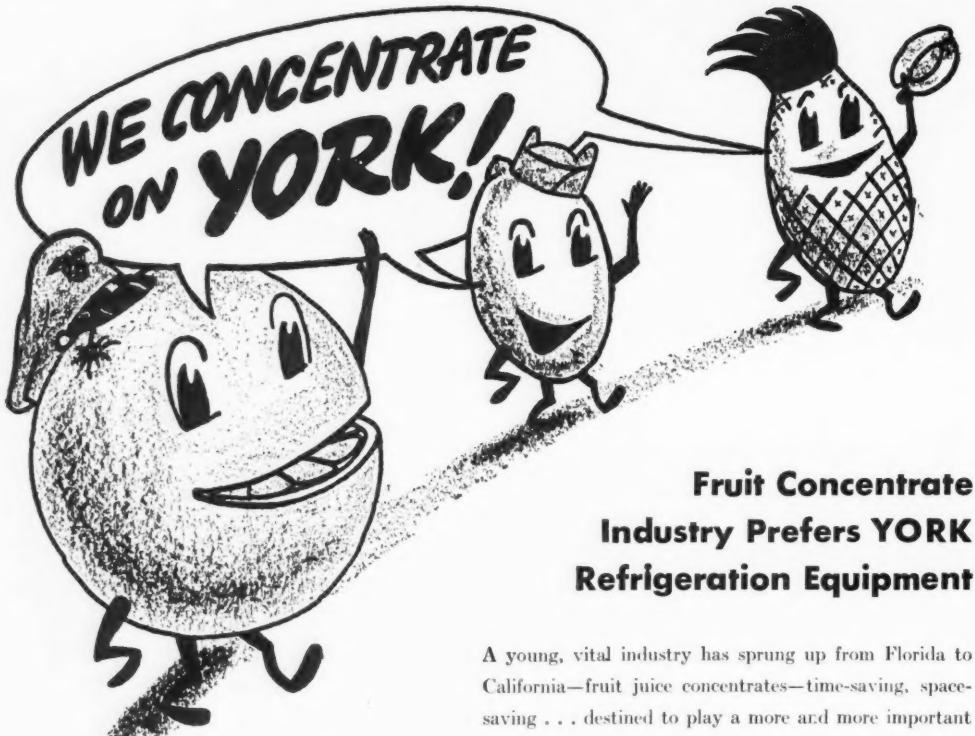
We are interested in Vacuum Processing Equipment for processing _____. We'd like some information and recommendations.

Name _____

Company _____

Address _____

City _____ Zone ____ State ____



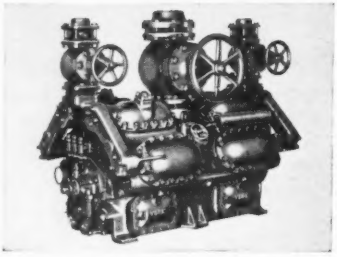
Fruit Concentrate Industry Prefers YORK Refrigeration Equipment

A young, vital industry has sprung up from Florida to California—fruit juice concentrates—time-saving, space-saving . . . destined to play a more and more important role in our defense program.

A big reason for York pre-eminence among efficiency and economy minded fruit concentrators is York's tough, vibration-free, trouble-free V/W Ammonia Compressor—which sends refrigeration power costs into a tailspin.

The V/W Compressor's power consumption *drops in proportion to product load*—with power savings up to 72% at 25% load! This means work schedules can be based on actual production plans instead of on fixed machine capacity.

Field proven for over twelve years, the V/W Ammonia Compressor comes in 4, 6, 8, 12, 16 cylinder models—versatile performers to match every industrial refrigeration need. Check your York Representative, listed in classified directory, or write York Corporation, York, Pa.



York's V/W Ammonia Compressor

Whatever the application, whatever the industry, York techniques and equipment keep ahead of the growing and changing demand for refrigeration and temperature control. York has led the field for seventy-five years.

The big advances come from YORK

Headquarters for— **Refrigeration and Air Conditioning**

SYLVANIA® CELLOPHANE

— gives your packaging the jump on competition!

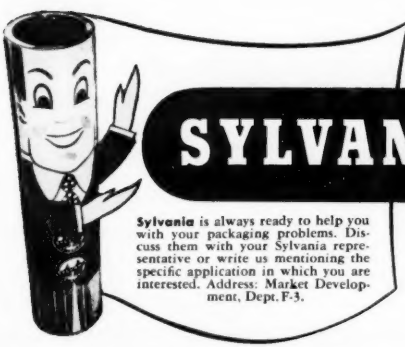
Sylvania Cellophane MS-1 in the 300 gauge provides moisture protection for fruited nut buns . . . the product keeps moist and flavorful.

These are some of the properties that can help your products win sales:

1 MOISTURE PROTECTION

2 Durability **4** Easy application
3 Transparency **5** Grease protection

Visit Our Booth at the A. M. A. National Packaging Exposition, Public Auditorium, Atlantic City, April 17-20, 1951.



SYLVANIA® CELLOPHANE

Sylvania is always ready to help you with your packaging problems. Discuss them with your Sylvania representative or write us mentioning the specific application in which you are interested. Address: Market Development, Dept. F-3.

SYLVANIA DIVISION AMERICAN VISCOSE CORPORATION
Manufacturers of cellophane and other cellulose products since 1929
General Sales Office: 1617 Pennsylvania Blvd., Philadelphia 3, Pa.
Plant: Fredericksburg, Va.

AN ORIGINAL LITHOGRAPH BY HENRY E. WINZENREID

THE PROOF OF THE PUDDING...

Makers of prepared desserts know that "the proof of the pudding is in the eating." Their materials are so hygroscopic that carefully designed, moisture-proof packages are required to keep the dampness out and the goodness in. That's why so many well-known powdered desserts are protected by laminated Riegel papers specially designed for the job.

There's a Riegel Paper for almost any requirement you may have in protective packaging . . . a paper you can depend on for economy and production efficiency. We feel sure we can serve you in the same effective manner we now serve the sales leaders in so many different fields.

Riegel Paper Corporation • 342 Madison Avenue, New York 17, N. Y.

Riegel **TAILOR-MADE PAPERS FOR PROTECTIVE PACKAGING**

MONSANTO SODIUM BENZOATE

preserves soft drinks and soft-drink sales

Soft-drink bottlers and manufacturers of fountain syrups and crushed-fruit toppings for sundaes use Monsanto Sodium Benzoate for two reasons: First, for its recognized preservative value; Second, for its ability to keep their products fresh and appealing through long periods of shelf life. Thus, it preserves both products and sales.

Monsanto sodium benzoate is the sodium salt of benzoic acid, one of the purest chemicals manufactured in commercial quantities. As in the case of all food-use chemicals, Monsanto produces sodium benzoate under strict laboratory control—assaying 99.0% purity.

Manufacturers using food preservatives are offered Monsanto sodium benzoate in both flake and powder form. Both are equally pure and uniform, although many prefer the flake form. It is easier to use—is practically dust-free—does not cake or ball—dissolves instantly.

Added information on Monsanto Sodium Benzoate is available in literature form. Send for copies—mail the coupon or contact the nearest Monsanto Sales Office. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second St., St. Louis 4, Mo.

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

Uses for MONSANTO BENZOATES in FOOD PRESERVATION

Soft drinks	Jams	Relishes
Fountain syrups	Jellies	Salads
Fruit toppings	Preserves	Oleomargarine
Fruit juices	Pickles	

MONSANTO CHEMICALS FOR PLASTICS

MONSANTO CHEMICAL COMPANY
Organic Chemicals Division
1700 South Second Street, St. Louis 4, Missouri

Please send copy of ☐ "Preserving with Monsanto Sodium Benzoate," ☐ "Benzoic Acid and the Benzoates."

Name..... *Title*.....

Company.....

Street.....

City..... *Zone*..... *State*.....

SERVING INDUSTRY . . . WHICH SERVES MANKIND

POINTS TO CHECK ✓

IN YOUR COOLING TOWER INVESTMENT

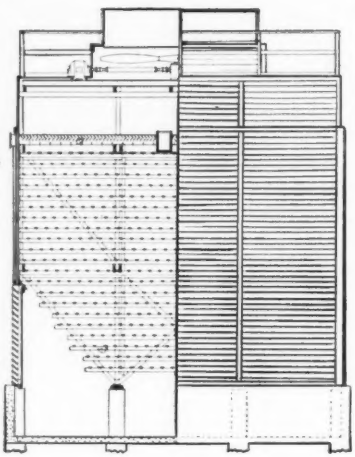
Here's what you get with a *C.H. Wheeler* Cooling Tower

GUARANTEED COOLING RESULTS—Names of installations near you sent on request. Repeat orders prove customer satisfaction. ✓

TWO TENTHS OF 1% DRIFT LOSS—Accurately placed Herringbone Drift Minimizers save on make-up water. ✓

MOST EFFICIENT WATER BREAK-UP—Wood fill arranged for best combination of wetted surface and water drop surface to speed cooling. ✓

NON-COLLAPSING FILL—Rugged 2" x 2" redwood members sawed diagonally—last the life of tower. ✓



✓ **GUARANTEED WIND-SAFE**—Standard construction for 100 miles per hour—(75 mph is hurricane velocity).

✓ **ADVANCED DESIGN PLASTIC FANS**—on large towers pioneered by C. H. Wheeler—adjustable pitch blades—20-1 safety factor.

✓ **CASINGS CONFORM**—to architecture—to fire codes—may be many materials, including redwood, asbestos cement board, masonry, brick, properly painted steel, etc.

✓ **NON-CORROSIVE ELEMENTS**—Fill is slot-fitted; no nails. Nuts, bolts, etc., furnished in non-corrosive metals. Plastic fan blades.

EASE OF ACCESS—into all parts of tower, *including the cooling space,* for regularity of maintenance. ✓

CUSTOM BUILT—Sure to satisfy your specific requirements. ✓

✓ **ENGINEERED FOR THE CLIMATE**—50 years of successful experience in building for arid, tropical and cold areas, including severe icing conditions.

✓ **INDUCED, FORCED, OR NATURAL DRAFT**

LITERATURE MAILED ON REQUEST ✓

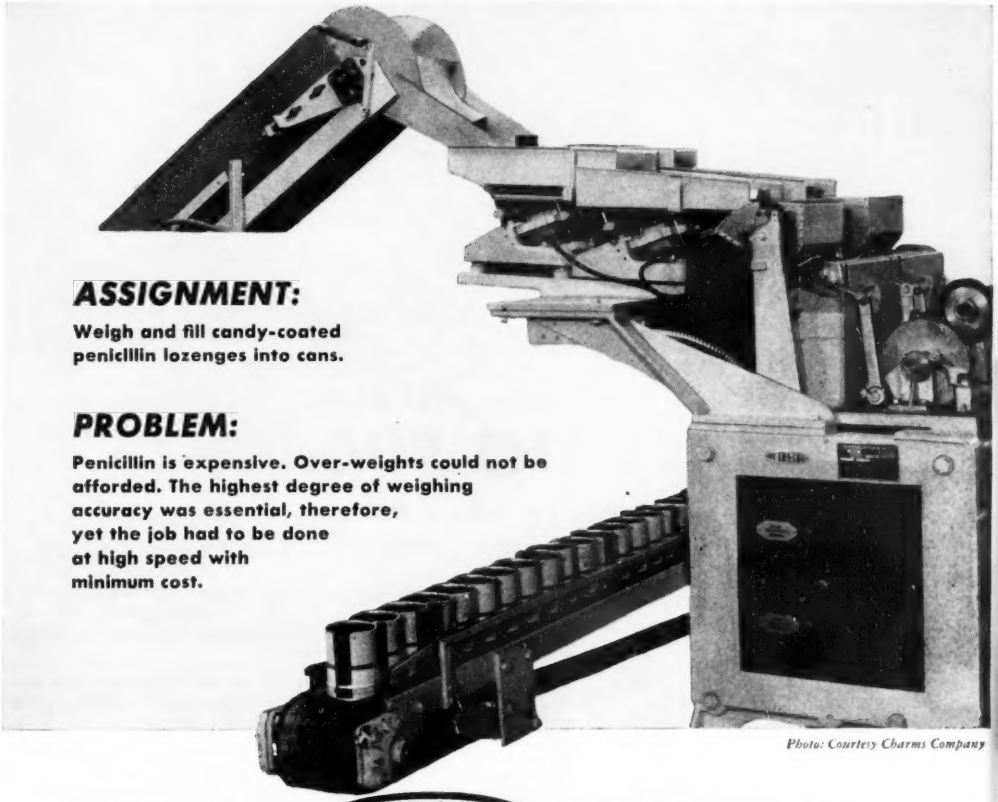
C.H. Wheeler OF PHILADELPHIA

VACUUM REFRIGERATION—COOLING TOWERS—HIGH VACUUM PROCESS EQUIPMENT—MICRO-PARTICLE REDUCTION MILLS—STEAM CONDENSERS—STEAM JET EJECTORS—MARINE CONDENSERS & EJECTORS—DECK MACHINERY

C. H. WHEELER MANUFACTURING CO., 1828 SEDGLEY AVE., PHILADELPHIA 32, PA.

REPRESENTATIVES IN MOST PRINCIPAL CITIES

ACCURACY UNSURPASSED!



ASSIGNMENT:

Weigh and fill candy-coated penicillin lozenges into cans.

PROBLEM:

Penicillin is expensive. Over-weights could not be afforded. The highest degree of weighing accuracy was essential, therefore, yet the job had to be done at high speed with minimum cost.

Photo: Courtesy Charms Company

SOLUTION: HY-TRA-LEC® Weighing System

HY-TRA-LEC is a method of weighing which is new in packaging machinery.

An exclusive and patented development of Wright Machinery Company, the first HY-TRA-LEC weigher was marketed in 1946. Charms Candy Company was among the first of a growing number of leaders in its industry to use HY-TRA-LEC on its regular production line.

Charms knew from experience that accuracy at high speed is possible with HY-TRA-LEC. When an assignment presented itself which called for superiority in this respect, Charms had the answer. Install a HY-TRA-LEC Model M-2. Charms did and *the problem was solved.*

HY-TRA-LEC high-speed accuracy saves you money, enables you to cope with rising prices and labor costs. Get full details now. A series of models are available in single and multiple weighing units for both semi-automatic and automatic packaging lines. Wright engineers will be glad to study your particular needs and make recommendations.

• ***Write or wire today.***

WRIGHT MACHINERY COMPANY

EST. 1893 · 333 CALVIN ST., DURHAM, N. C.
SUBSIDIARY OF THE SPERRY CORPORATION

COMPANY SALES OFFICES IN DURHAM, JERSEY CITY AND BOSTON. KING & ANDERSON, SAN FRANCISCO. R. P. ANDERSON, DALLAS
SPERRY GYROSCOPE COMPANY, LTD., LONDON

THE HAWAIIAN CANE SUGAR INDUSTRY

Complete bulk sugar handling and ship loading systems have been designed, built and installed by Stephens-Adamson in the Hawaiian Islands at Kahului, Hilo (shown at right) and Nawiliwili. Ship unloading and sugar storage systems are located at the California & Hawaiian Sugar Company plant at Crockett, Calif.

Bulk Storage and Shiploading plant at Hilo, Hawaii

When This Industry Said:

"PASS THE SUGAR"

It Meant 10 Tons a Minute

S-A Unloading Gantries at Crockett, California

The unloading gantries shown at left, make it possible to remove bulk sugar from the holds of ships at a rate of 600 tons per hour. Belt Conveyors carry sugar to the warehouses where S-A centrifugal piler units place sugar in the far corners for maximum storage.

Mechanized handling of raw bulk sugar has several important advantages over the older, costlier and slower methods as follows:

1-Ships can be loaded in one day and unloaded in two, thus each ship spends less time in port. . .a ship can make four round trips in the time it used to require for three.

2-Only one-sixth the usual hand labor is required for loading and unloading operations. . . .efficiency is increased and a back-breaking job is eliminated.

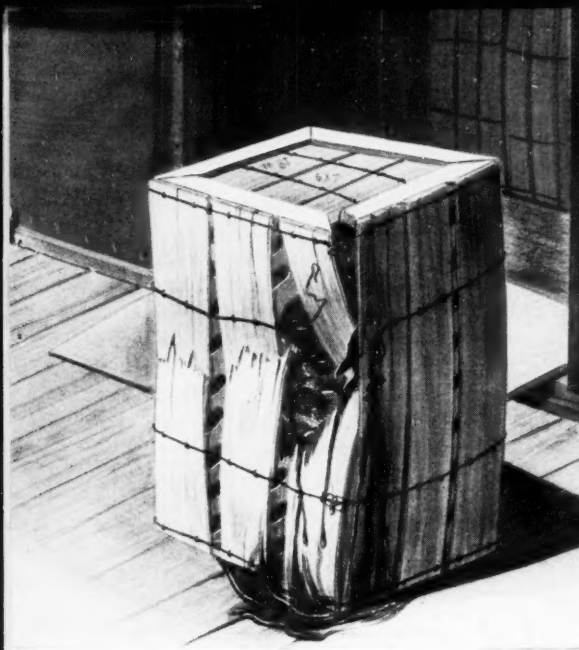
3-Handling sugar in bulk eliminates the expense of burlap containers, speeds up handling and permits most efficient use of cargo and warehouse space.

Stephens-Adamson engineers, in cooperation with the sugar industry, have pioneered the methods and equipment for speeding up production and drastically reducing handling costs. Write us for full details. . .no obligation, of course.

STEPHEN S-A ADAMSON MFG. CO.

6 RIDGEWAY AVENUE AURORA, ILLINOIS — LOS ANGELES, CALIF. • BELLEVILLE, ONT.

Designers and Manufacturers of Bulk Materials Handling Equipment



stop freight damage eating into your profits!

Unicel

— The first really **new** *freight car in 52 years!*

Safer, stronger, more efficient than ordinary steel cars, **UNICEL** *cushions shocks, cuts vibration. Tests prove there is 66% less road shock with Unicel than ordinary freight cars. Goods arrive in first class condition.*

Using in its construction the latest developments in the modern science of cellular laminates, UNICEL . . .

- maintains a more uniform temperature; condensation and dehydration are reduced to a minimum. "Cold-Wall" construction and insulation plus a new mechanical refrigerating unit quickly convert UNICEL from a box to a refrigerator car. Heat can be provided during winter weather or in cold climates!
- has a greater carrying capacity—is longer than ordinary cars.
- easier to load and unload—has wider doors. Built-in Unistrapping system enables shippers to tie down any kind of a load—securely, quickly and economically.
- easier to clean and keep clean—entire inside and outside is continuous and smooth without sharp corners, pockets or cracks.
- costs less to build, buy, operate, maintain.

It's another notable ***FIRST*** *for Pressed Steel Car Company*
FIRST *with the all steel hopper car in 1897*
FIRST *with the all steel freight car in 1914*
FIRST *again with UNICEL in 1950!*

Shippers and receivers of grain, meat, dairy produce, fruits, vegetables, canned goods and other foodstuffs are invited to learn about the many specific advantages of the new UNICEL car. Write for a copy of our brochure "UNICEL—The Freight Car of the Future—Today"

UNICEL

PRESSED STEEL CAR COMPANY, Inc.

6 No. Michigan Ave., Chicago, Ill.

Finest Buy in the Land . . . on *Every* Count!

NEW 1951 CHEVROLET

Advance-Design TRUCKS

These new 1951 Chevrolet trucks are tops in value. They're tough and rugged. They're loaded to the brim with power. They're thrifty . . . move massive loads . . . handle like no other truck. Chevrolet's latest haulers have 51's finest new features, too. Features like new, super-effective brakes that are extra-safe and easy to operate. Features like Chevrolet's Dual-Shoe parking brake, Chevrolet's new Ventipanes and new cab seats that bring you comfort with a capital "C." Visit your Chevrolet dealer and look over these great new trucks. You'll find the right truck for *your* job!

CHEVROLET MOTOR DIVISION, *General Motors Corporation*
DETROIT 2, MICHIGAN

CHEVROLET

ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—the 105-h.p. Loadmaster or the 92-h.p. Thriftmaster—to give you greater power per gallon, lower cost per load • **POWER-JET CARBURETOR** — for smooth, quick acceleration response • **DIAPHRAGM SPRING CLUTCH**—for easy-action engagement • **SYNCHRO-MESH TRANSMISSIONS**—for fast, smooth shifting • **HYPOID REAR AXLES**—for dependability and long life • **NEW TORQUE-ACTION BRAKES**—for light-duty models • **PROVED DEPENDABLE DOUBLE-ARTICULATED BRAKES**—for medium-duty models • **NEW TWIN-ACTION REAR BRAKES**—for heavy-duty models • **NEW DUAL-SHOE PARKING BRAKE**—for greater holding ability on heavy-duty models • **NEW CAB SEATS**—for complete riding comfort • **NEW VENTIPANES**—for improved cab ventilation • **WIDE-BASE WHEELS**—for increased tire mileage • **BALL-TYPE STEERING**—for easier handling • **UNIT-DESIGN BODIES**—for greater load protection • **ADVANCE-DESIGN STYLING**—for increased comfort and modern appearance.

Pick of the Crop

Colors that sell...
delivered when needed

From the world's finest color presses, natural colors that make a label *sell.* And with it, complete label *service* —the kind you can expect *only* from a label specialist.

Muirson's entire nationwide facilities concentrate on just one thing ... the design and production of better labels, scheduled for delivery when needed. Write for full details.

because **MUIRSON** specializes in **LABELS**

This page was prepared and produced in its entirety by MUIRSON LABEL CO., INC.
Complete plants in San Jose, Calif., Peoria, Ill., Meriden, Conn.

two good ways to—

BEAT THE HIGH COST OF FLAVORING

PEP-O-ROL®
MM&R
Closely approximates the flavor of
BLACK PEPPER

CARD-O-MAR
MM&R
Closely approximates the flavor of
CARDAMOM OIL

Low-cost blends of pure Spice Essential Oils...perfected in the laboratories of MM&R!

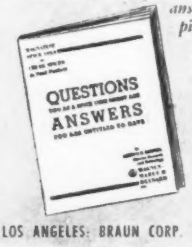
As THE MARKET in Black Pepper and Cardamom grows increasingly critical, more and more food processors are turning to MM&R's *natural* replacements — PEP-O-ROL and CARD-O-MAR MM&R. Here are two scientifically perfected oils that can be used *successfully* in place of the spices they duplicate. Yet they cost many times *less!*

Whether you use Black Pepper and Cardamom in crude spice, dry spice or Essential Oil form, you'll be amazed at the ease with which these spices can be replaced in whole or in part by PEP-O-ROL and CARD-O-MAR MM&R.

Write MM&R Technical Service Dept. today for full information.

*Contains natural oleoresins as well as pure spice essential oils.

FREE! *An important technical paper — in the form of questions and answers — that will give you a clear and complete picture of the place of Spice Essential Oils in the flavoring of food products. Write for it now!*



13 reasons why MM&R MAGNATEST SPICE OILS GIVE BETTER RESULTS

1. more economical.
2. make it possible to flavor your product uniformly.
3. cannot cause discoloration.
4. do NOT mold.
5. release 100% of flavor immediately.
6. prevent introduction of rodent excreta, hair or pellets, insects or insect fragments, etc.
7. always constant in flavor value
8. easy to measure in exact quantities.
9. take up less storage space than crude spices or flavored salt or sugar.
10. decrease freight expense.
11. prevent losses due to exposure during storage.
12. easy to blend.
13. prevent overflavoring of prepared food products during shelf life.

MAGNUS, MABEE & REYNARD, INC.
SINCE 1895 ... ONE OF THE WORLD'S GREATEST SUPPLIERS OF ESSENTIAL OILS

16 DESBROSSES STREET, NEW YORK CITY • 221 NORTH LASALLE STREET, CHICAGO

LOS ANGELES: BRAUN CORP. • SEATTLE, PORTLAND, SPOKANE: VAN WATERS AND ROGERS, INC. • SAN FRANCISCO: BRAUN-KNECHT-HEIMANN CO.

. . . maintain 100% LEAK-TIGHT JOINTS with SUPER SPEED Tools!

COSTLY, messy, *unnecessary* leakage of your product from worn, improperly seated sanitary fittings can be *eliminated* quickly, easily and at very low cost . . . through the use of *SUPER SPEED* TOOLS. Here are three major benefits these dependable tools assure:

1. LEAK-TIGHT JOINTS . . . Extreme accuracy in facing and seating operations assures a perfect seal.
2. FAST, SIMPLE MAINTENANCE . . . Few easy operations easily mastered by even unskilled personnel.
3. LONGER FITTING LIFE . . . Old, worn fittings quickly renewed for continued service.

SUPER SPEED TOOLS will pay for themselves over and over again, eliminating leakage and saving maintenance time and expense. They will also help protect product quality, increase production, and in keeping your plant completely clean. And remember — these tools have industry-wide endorsement. *Your satisfaction is guaranteed. Get full details today.*

ABOVE: SUPER SPEED Tools in use. LEFT: Vise and expanding blocks for expanding operation. RIGHT: Sawing vise, used in common bench vise.

LEFT: Simple, positive tube expanders provide fast, efficient expansion.

ABOVE: Torqometer provides accurate expanding through predetermined pressure.

LEFT: Seating Tool provides inside and outside bevel — also used for facing.

"Tools Guaranteed To Satisfy"

NOW AVAILABLE THROUGH YOUR LOCAL JOBBER

Tri-Clover
MACHINE CO.
Kenosha, Wisconsin

TRIALLOY AND STAINLESS STEEL SANITARY FITTINGS, VALVES, PUMPS, TUBING, SPECIALTIES

FABRICATED STAINLESS STEEL INDUSTRIAL FITTINGS AND INDUSTRIAL PUMPS

THE Complete LINE

JACK BARTUSH, right, starts another delivery of Shedd-BARTUSH FOODS on its way via White Super Power!

Shedd-BARTUSH FOODS Step Up Delivery Schedules with WHITE SUPER POWER Fleet

PERISHABLE FOODSTUFFS move fast for Shedd-BARTUSH FOODS, Inc., of Detroit, Mich., who depend on their fleet of Super Power Whites for economical and efficient transportation.

Whites move both raw materials and finished food products on a fast shuttle system which joins Shedd-Bartush Foods many plants throughout the east, south and southwest.

This progressive company knows that dependable trucks are money makers . . . when they provide efficient service . . . at lowest cost . . . year after year!

Shedd-Bartush Foods, Inc., has a fleet of 20 White tractors which keep on the go, rolling up the miles, performing as part of production lines. Delivery schedules of Keyko Margarine are important, but operating costs are important, too, and the Whites keep both in mind.

Here is another example of how White Trucks add efficiency and economy to the food industry by providing the best in truck transportation. Find out the extra advantages of an investment in Whites for your business.

White

THE WHITE MOTOR COMPANY

Cleveland 1, Ohio

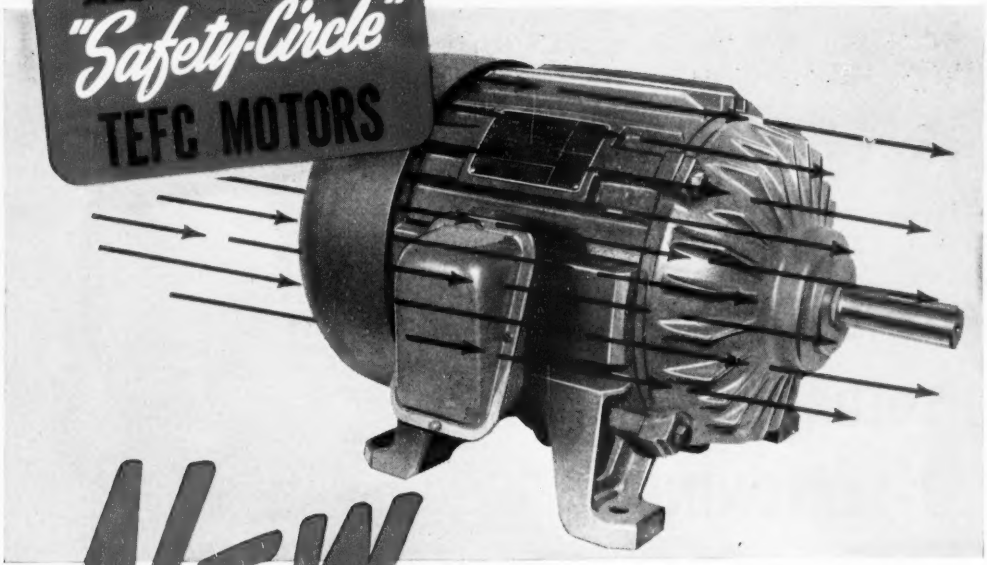
Builders of the complete line of White trucks and tractors for the food industry, including the Model 3000 with the power-lift cab.

FOR MORE THAN 50 YEARS THE GREATEST NAME IN TRUCKS

ALLIS-CHALMERS

"Safety-Circle"

TEFC MOTORS



NEW Easy to Clean Resists Corrosion

CORROSIVE ATMOSPHERES CAN'T HURT this Allis-Chalmers totally enclosed, fan-cooled motor because major parts are enclosed in a rigid corrosion resistant cast iron frame! No extra treatment is needed and cast iron's corrosion resistance won't chip off.

Lower Maintenance, Too

No corners, pockets or hidden air passages to collect dirt. Cleaning is the simplest of maintenance operations. Just blow off the dirt with an air hose. Fan and housing design keep cooling airflow tight against the yoke so dirt does not accumulate and cleaning is seldom required.

Factory Lubricated Bearings

Bearings are lubricated at the factory and operate without attention or cost for years. Extra rigidity of the cast iron frame holds bearings in true alignment under all operating conditions. This gives long bearing life and low operating costs.

Get All The Facts

The new *Safety Circle* totally-enclosed fan-cooled motor is built in all NEMA standard frame sizes from 224 to 505. Call your nearest Allis-Chalmers Authorized Dealer or Sales Office for complete information or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B6144. A-3228

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

Safety Circle, Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

ROYAL SOLUBLE SEASONING

for Sunny-Day Flavor

ROYAL SOLUBLE SEASONINGS are truly distinctive—in flavor potency, purity and uniformity! Griffith has conquered the disturbing elements in nature! . . . eliminated the flavor variations in spices! And changed spice blending from an art to a science—with predictable, dependable results for spice users.

The secret to this new, high standard in flavor quality lies in Griffith's revolutionary extraction process*. It removes the disturbing strains in flavor . . . captures and measures the full potency of "true" flavors in spices.

Use ROYAL SOLUBLE SEASONINGS and improve your products with dependable, uniform *sunny-day* flavor. Write today.

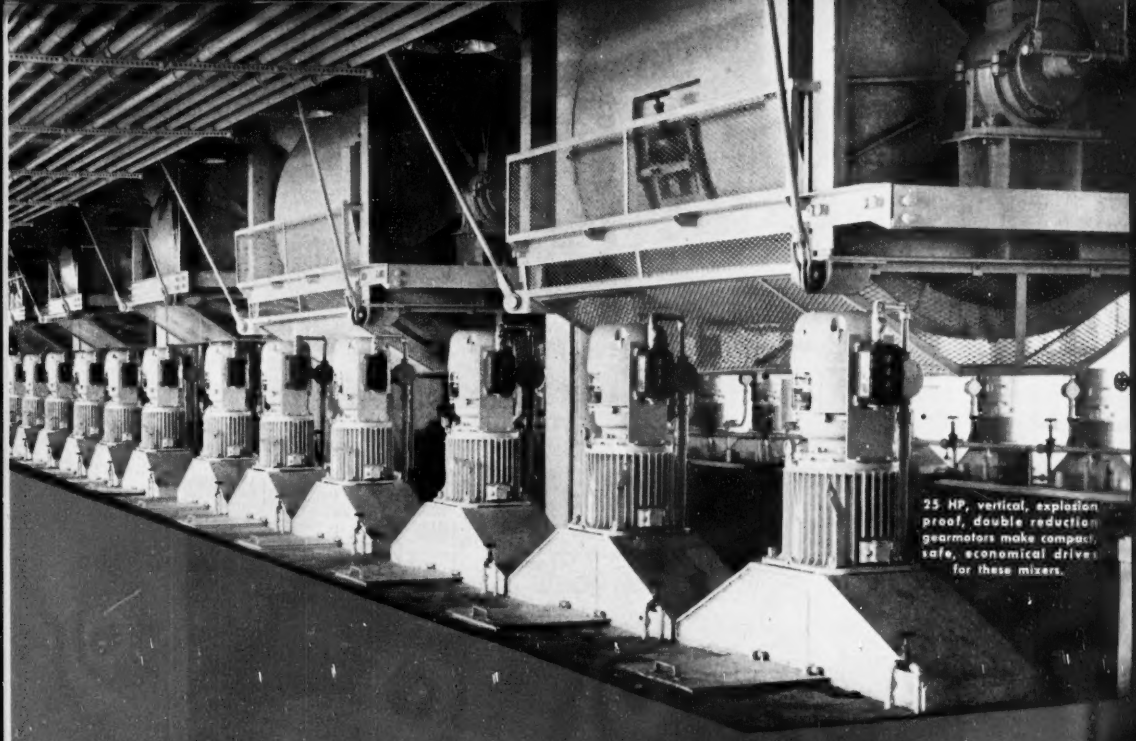
*Patent Applied For.

A Symphony of Flavor

The **GRIFFITH LABORATORIES, Inc.**

In Canada—The Griffith Laboratories, Ltd.

CHICAGO 9, 1415 W. 37th St. • NEWARK 5, 37 Empire St. • LOS ANGELES 58, 4900 Gifford Ave. • TORONTO 2, 115 George St.



25 HP, vertical, explosion proof, double reduction gearmotors make compact, safe, economical drives for these mixers.

Don't be satisfied with "good enough" because too often good enough means mediocre. And if the "good enough attitude" becomes too much of a habit it can wreck the future of a man or a company.

Don't put up with "good enough," makeshift assemblies for your power drives when it's so easy to get the RIGHT horsepower, the RIGHT shaft speed, the RIGHT construction features, the RIGHT mounting . . . all combined into one compact power package.

Master Motors, available in thousands and thousands of types and ratings (up to 150 HP), give you an enormous selection of units designed so that they easily combine to give you a power drive that will add greatly to the compactness, safety and economy of each job.

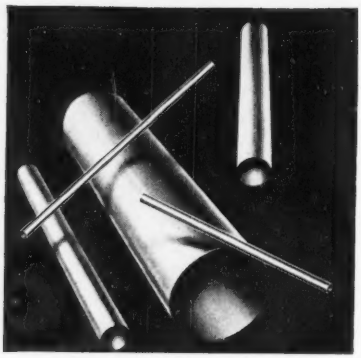
make them better than

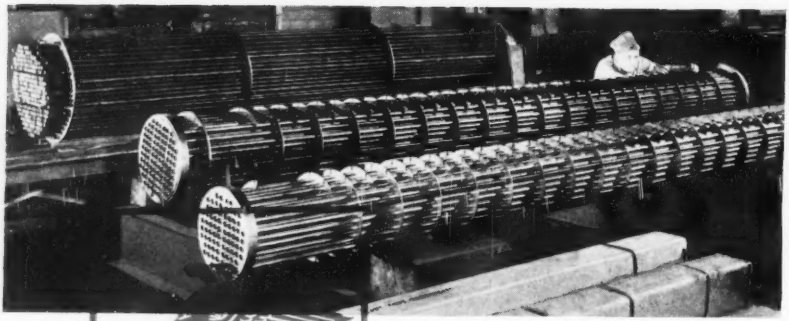
GOOD ENOUGH

Open, enclosed, splash proof, fan cooled, explosion proof . . . horizontal or vertical . . . for all phases, voltages and frequencies . . . in single speed, multi-speed and variable speed types . . . with or without flanges or other special features . . . with 5 types of gear reduction up to 432 to 1 ratio . . . with electric brakes . . . with mechanical variable speed units . . . and for every type of mounting . . . Master has them all and so can be completely impartial in helping you select the one best motor drive for YOU.

Select the RIGHT power drive from Master's broad line and you can increase the saleability of your motor driven products . . . improve the economy and productivity of your plant equipment.

THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO





A. O. SMITH designs with TRENTWELD

When A. O. Smith, big name in steam and heat transfer equipment recently designed and built a heat exchanger unit for Socony-Vacuum – TRENTWELD Stainless Steel tubing was used throughout. This heat exchanger unit for use in the petroleum industry is another example of how TRENTWELD is preferred by designers for products where stainless steel tubing fits the bill.

And here's why: TRENTWELD is the product of tube specialists. That means you're assured uniform quality and specifications of manufacture that meet your most exacting needs. Then too, TRENTWELD is available in a full range of sizes—⅛" to 36" in diameter, in all grades and finishes. When the job requires stainless steel tubing, check with us. TRENT TUBE COMPANY, *Subsidiary of Crucible Steel Company of America.* General offices and plant – East Troy, Wisconsin; Sales offices in principal cities.

TRENTWELD

STAINLESS STEEL TUBING

Low first cost— low cost per ton handled

HYSTER *Salsbury* Turret Trucks

- ✓ **SIMPLE TO OPERATE.** Anyone can drive a HYSTER *Salsbury* Turret Truck.
- ✓ **USES LESS THAN ONE GALLON OF GASOLINE** per average 8-hour shift.
- ✓ **GREAT MANEUVERABILITY.** 360° steering is done through the drive wheel.
- ✓ **FULLY AUTOMATIC CLUTCH AND TRANSMISSION.** No gear shifting, no levers. Provides the power required under ALL DRIVING CONDITIONS. The truck can be "inched" along or driven up to 8 miles per hour fully loaded; 10-12 miles per hour when empty. Operator rides, or walks alongside truck.
- ✓ **TURRET POWER UNITS** are interchangeable on all Turret Trucks.

HYSTER is one of the oldest names in the materials handling industry. . . . HYSTER trucks are sold and serviced by 52 dealers in the United States and Canada and by dealers in 58 foreign countries. Wherever you are, sales, service and parts are available on the Hyster line of industrial lift trucks, Straddle Trucks, Karry Kranes and HYSTER *Salsbury* Turret Trucks.

PALLET TRUCK. Transports loaded pallets weighing up to 4000 pounds. Several fork lengths. Hydraulic fork lift.
PLATFORM TRUCK. Handles loads of 4000 pounds on skids or tote boxes. Several lengths and widths. Hydraulic platform lift.
TUG. Tows trailer trains up to 20,000 pounds. Most maneuverable towing unit on the market.
CARGO TRUCK. Capacity 4000 pounds. Low platform makes bulky or heavy cargo handling easy.
HYSTER

HYSTER
COMPANY

THREE FACTORIES

2902-35 N. E. Clackamas, Portland 8, Ore.
1802-35 North Adams . . Peoria 1, Illinois
1010-35 Meyers Street . . Danville, Illinois

Operator Either Rides or Walks . . .

HYSTER *Salsbury* Turret Trucks compare in cost to most "walker-controlled" trucks—with all the features of rider-operation.

These horizontal transporters handle any type of load up to 4000 pounds. They go anyplace where man-pulled or power-driven trucks of the "walker-controlled" type can go—and the operator EITHER RIDES OR WALKS.

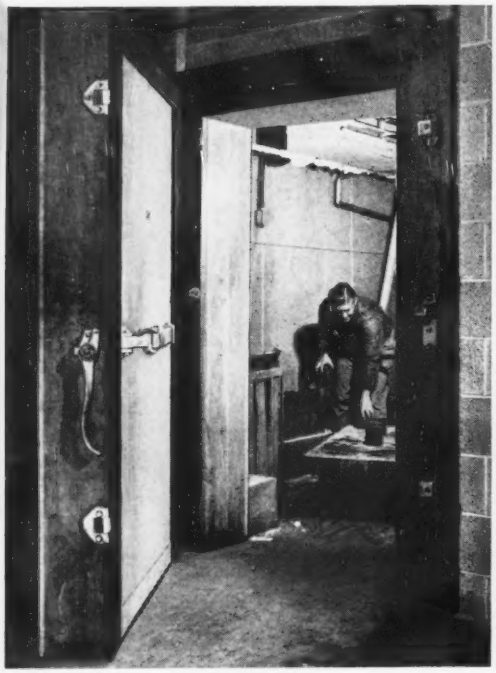
HYSTER *Salsbury* Turret Trucks are basic machines for new materials handling plans — will fit into any existing system. In wholesale drug and grocery companies, automobile or aircraft plants, warehousing, docks, shipping terminals, refineries, produce markets . . . anyplace where there is a need for fast, low-cost handling, Turret Trucks are in use. Tight quarters, narrow aisles and ramps are no problem for the Turret Trucks.

JAMISON DOORS

Installed in Model Research and Development Laboratories

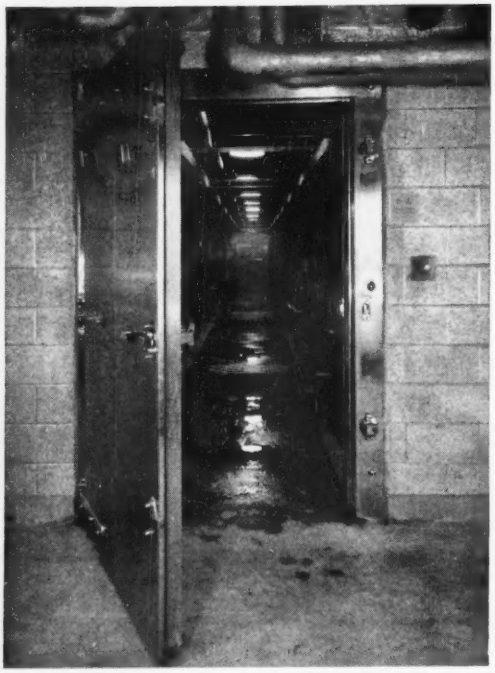
ONLY THE BEST DOORS WERE GOOD ENOUGH

for installation in Portland Cement Association's national research and development laboratories. This famous center houses more than 30 laboratories—moist curing rooms, fog rooms, controlled atmosphere rooms capable of duplicating conditions of arctic cold or tropic heat and humidity from desert dryness to saturation. Here, every climate encountered anywhere in the world can be reproduced!



FOR TESTING TO 25° BELOW ZERO

the popular Jamison SUPER FREEZER Door is used in this Testing Room where all effects of extremely low temperature are studied.



IN MOISTURE AND HUMIDITY TESTING ROOM

the Stainless Clad, Jamison LO-TEMP Door provides a moisture and vapor-proof barrier and seal.

Standard models of superior Jamison-built doors are available in a wide range of sizes. We will also build any *special types or sizes* of cold storage doors TO YOUR SPECIFICATIONS! Write for Catalog 175. Jamison Cold Storage Door Co., Hagerstown, Md. U.S.A.

JAMISON

HAGERSTOWN, MARYLAND, U. S. A.

The leader for over 50 years.

TRADE PAPER EDITION
Published by
SCHUTTE and KOERTING
Company

ENGINEERING News

JET APPARATUS • HEAT TRANSFER EQUIPMENT • STRAINERS • CONDENSERS AND VACUUM PUMPS • OIL BURNING EQUIPMENT •
ROTAMETERS • FLOW INDICATORS • RADIAFIN TUBES • VALVES • SPRAY NOZZLES AND ATOMIZERS • STEAM TRAPS • DESUPERHEATERS

The photo above shows the extent to which SK Rotameters are used in the plant of Publicker Industries, Inc., of Philadelphia, world's largest producers of industrial alcohol. All of the Rotameters shown on the panel are of the SK Universal type and are used to measure fluid flow rates in the manufacture of commercial alcohol. Numerous sizes are represented since capacity requirements vary considerably. *Bulletin 18-RA pictures and briefly describes the numerous types of Rotameters manufactured by SK and lists the technical bulletins available. If interested, send for a copy.*

SK Products List Offered

A new "Index of SK Equipment and Descriptive Bulletins" has just been issued by the company. This index lists products by application and alphabetically, together with the numbered descriptive bulletin pertaining to each product. Copies are available on request.

SCHUTTE and KOERTING Company
Manufacturing Engineers
25 CORNWELLS HEIGHTS
BUCKS COUNTY, PA.
Representatives in Principal Cities

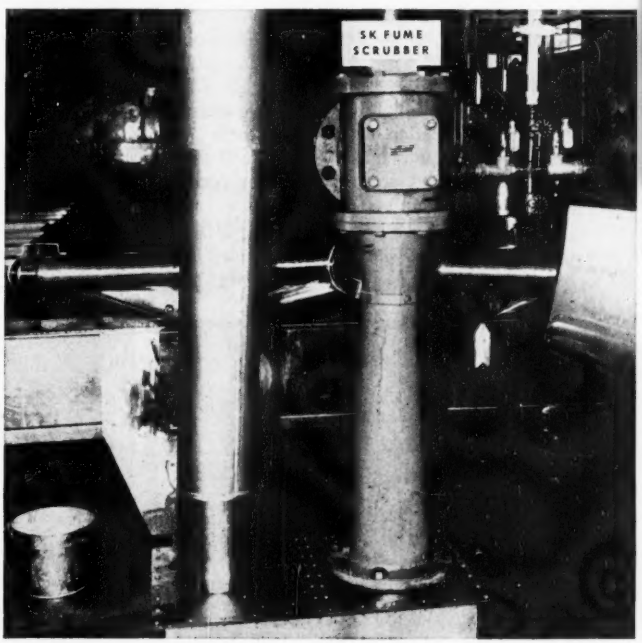
Frito Co. Purges Plant Fumes To Insure That Famous Flavor

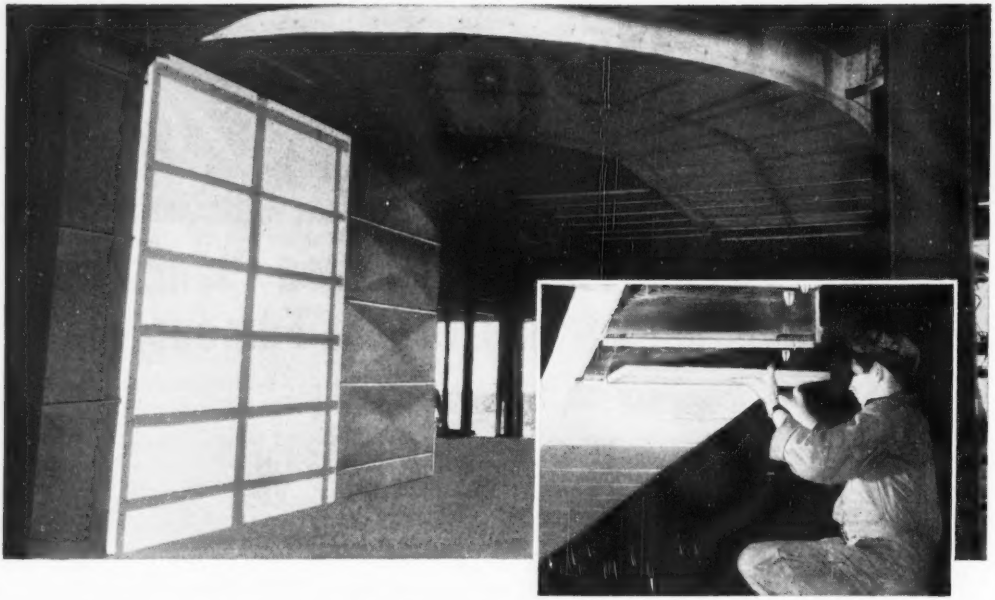
Fritos, popular, taste-tempting corn chips of The Frito Company, are made under conditions as ideal as the company can make them to maintain and protect quality and flavor. Even the cooking vapors are collected and eliminated from the cooking tanks and plant. As a simple and efficient method of accomplishing this in various plants across the country, the company uses SK Fume Scrubbers, one of which is shown in the photo, with highly satisfactory results.

Since the cooking vats use oil at about 400° F., large amounts of steam and oil vapors are given off in cooking. These vapors are removed in the following manner:

Water, under pressure, enters the fume scrubber at the top through a spray nozzle designed to provide an angle of spray most suitable for maximum entrainment and scrubbing efficiency. The velocity of the water spray creates a draft in the chamber of the fume scrubber and causes the vapors to be drawn into the chamber where they are entrained, condensed, and absorbed by the water which is then discharged into a tank and removed from the plant. In this manner all odorous fumes are entrained by the scrubbing water, and vapors accompanying the fumes are condensed at the same time.

SK Fume Scrubbers, being simple in construction, efficient, and easy to keep clean, are particularly well suited for use in food processing plants. *For complete details on all types and sizes, request Bulletin 4-R.*





The job's Installed and Operating sooner with

OWENS-CORNING
FIBERGLAS **DUCT INSULATION**

Are you building, or getting your plant set for all-out production? Fiberglas* Duct Insulations will help get you into production quicker. Why? Because this feather-light fibrous glass material saves the construction of extra supports . . . handles easily . . . cuts and fits neatly and easily with an ordinary jackknife—a handful of benefits that apply man-hours better!

And, of course, these ageless fibers of glass won't corrode or feed flame, won't absorb odor or moisture. Fiberglas Duct Insulations have exceptional thermal efficiency, resist erosion, paint easily, and hush noise, when applied on interior of ducts—another handful of benefits that means a better job at no extra cost.

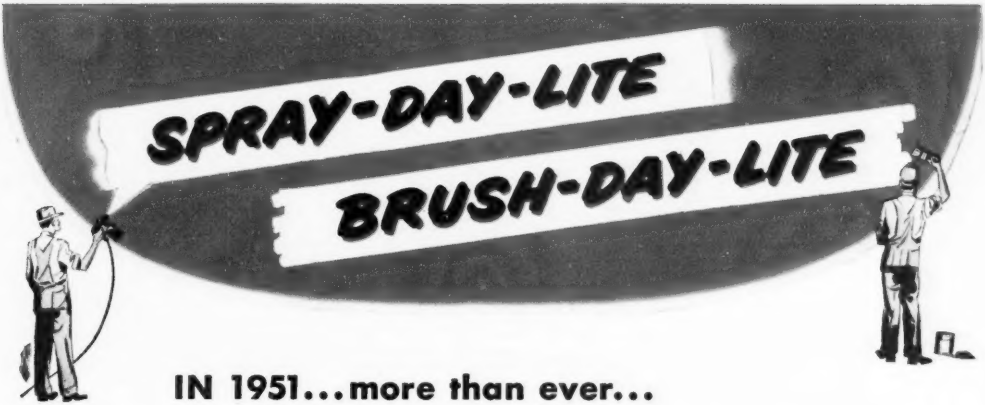
Shown here are different forms of Fiberglas Insulations for ducts. Ask your Fiberglas branch office for design data and information on how to use each kind for a speedy, satisfactory job. Or address OWENS-CORNING FIBERGLAS CORPORATION, Dept. 99-D, Toledo 1, Ohio.

Fiberglas PF (Preformed) Insulation is available in desired degrees of rigidity and has excellent acoustical properties. Manufactured in panels 24" x 48", ½", 1" and 2" thicknesses.

Fiberglas TW-F Insulating Wool is a general-purpose insulation available in batt and roll forms.

*Fiberglas (Reg. U. S. Pat. Off.) is the trademark of Owens-Corning Fiberglas Corporation for products made of or with fibers of glass.

FIBERGLAS IS IN YOUR LIFE...FOR GOOD!



IN 1951...more than ever...

it pays to use America's leading

one-coat

Interior Maintenance Paint!

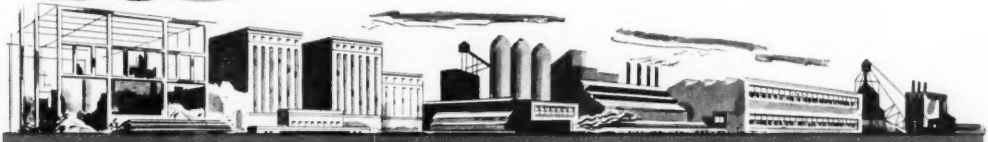
America's First and Finest

COLOR SERVICE

to make your painting pay extra dividends at no extra cost

A service comprising detailed color suggestions tailor-made for you by trained consultants from Glidden Color Laboratories with over 21 years of experience. These comprehensive color harmony plans for interior painting based on Glidden's famous Sight Perfection Program pay important extra dividends! For complete information about this free service, write Dept. B-4.

The rearmament program demands heavy duty wall paints that cover in just one coat and give more years of service. Glidden SPRAY-DAY-LITE and BRUSH-DAY-LITE do both . . . saving you critical time, labor, material and money. Their high light reflection improves vision and eliminates eyestrain . . . reducing spoilage, promoting safety, building better employee relations. In non-fading white and 10 attractive colors.



Glidden MAINTENANCE PAINTS

QUALITY Glidden PRODUCTS

Pacemaker in Paints

THE Glidden COMPANY · CLEVELAND 2, OHIO

IN CANADA · THE GLIDDEN COMPANY, LTD., TORONTO 9, ONT.

IT MUST BE *Continuous!*

The Steady Grind of the Six-Day Racer

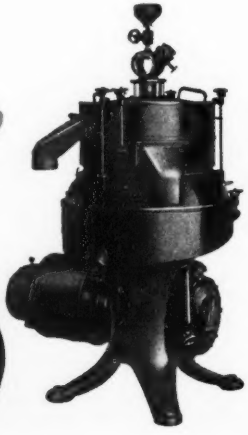
Processing, too, must be continuous to fit in a modern production schedule. Centrifugal force, employed to best advantage in a De Laval Separator or Clarifier, removes the cause of interruption from many a process that formerly was ***not*** continuous.

De Laval machines separate two liquids, or remove solid contaminants from either one or two liquids, in a matter of seconds. Where the job calls for the continuous removal and continuous discharge of solids from one or both liquids, that, too, can be accomplished by one of the De Laval "Nozzle-Matic" group of machines. The "Nozzle-Matic" Separators are available with various bowl and cover modifications to fit various requirements.

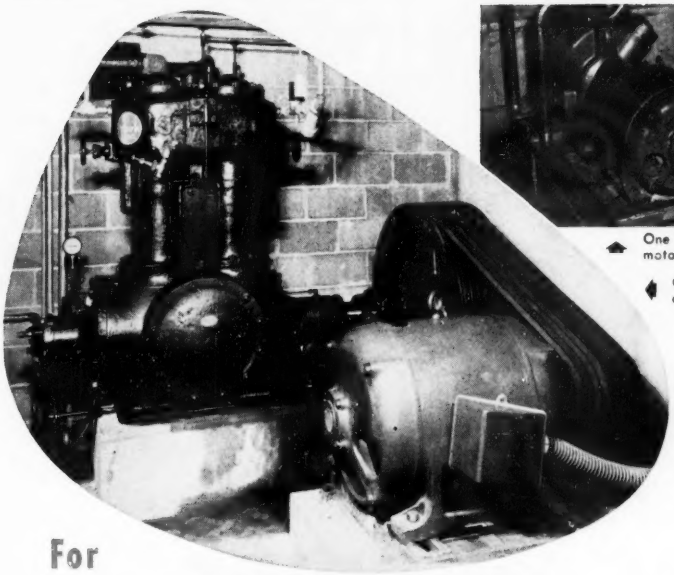
There is another good reason for letting De Laval solve your problems of separation or clarification. De Laval has solved so many problems of separation in its many years of experience that one quite similar to yours may already be in the files. It will pay you to ask.

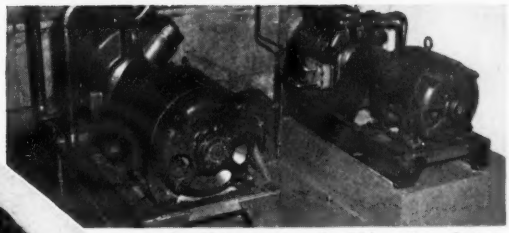
THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 6 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

De Laval



the First Name in Centrifugals
the First Thought for CONTINUOUS
SEPARATION · CLARIFICATION · CONCENTRATION





One 10 horsepower and a 25 horsepower Century motor furnish power to air condition an office.

Century 75 horsepower Type SCH motor driving a compressor in a skating rink.

Unusually Quiet Starting and Running Characteristics

For
REFRIGERATION COMPRESSORS
You Need the High Starting Torque of.....

Century

Type SCH Motors

Century Type SCH, Squirrel Cage polyphase alternating current High Torque motors are ideal for refrigeration compressor applications. They bring compressors up to speed smoothly and easily under full load.

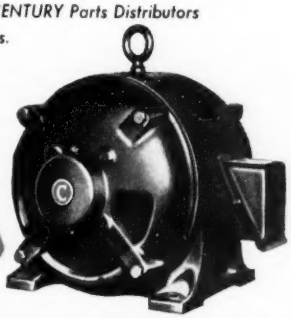
Century Type SCH motors have the high starting torque characteristics required for Refrigeration Compressors. The low starting current is desirable for automatic across the line starting.

In addition, Century builds a complete line of electric motors in a wide range of types, in sizes from 1/6 to 400 horsepower. Specify Century motors for all your electric power requirements.

Century Service Is Near Any Century Motor Driven Equipment. Satisfactory performance of CENTURY products is assured by more than 200 CENTURY Authorized Service Stations supervised by 28 CENTURY Sales offices.

1. *Facilities for immediate exchange of most CENTURY standard ratings of standard construction are available at CENTURY Authorized Service Stations.*
2. *CENTURY Authorized Service Stations are qualified and equipped to service and repair any piece of CENTURY apparatus.*
3. *Genuine CENTURY renewal parts are available at CENTURY Service Stations, CENTURY Parts Distributors and at the factory in St. Louis.*

CENTURY ELECTRIC CO. is Celebrating Its 50th YEAR in the Electrical Industry



Century C MOTORS

CENTURY ELECTRIC COMPANY • 1806 Pine Street, St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

702

B & A ANNOUNCES INCREASED PRODUCTION OF ANHYDROUS CALCIUM CHLORIDE

Purified and Reagent Grades

New Production Process Incorporates Latest Developments in Equipment and Automatic Control. Assures Consistent Quality, Uniform Particle Size!

To serve growing needs of chemical, pharmaceutical and food industries, Baker & Adamson has added extensive new production facilities for high purity Anhydrous Calcium Chloride at its B&A Works, Marcus Hook, Pennsylvania. Incorporating the latest developments in automatic control, the new process assures consistent quality and uniform particle size of the product.

As in the past, B&A Anhydrous Calcium Chloride—Reagent and Purified Grades—is available in various sizes ranging from number 20 mesh to ½" lumps. Each size is carefully processed to meet exacting production requirements. Like the reagent grade, the purified material is carefully controlled for alkalinity, making it especially adaptable for industrial drying operations. Both grades are porous to provide maximum absorption.

This increased productive capacity will enable Baker & Adamson to meet expanded laboratory and industrial requirements, as well as to maintain adequate stocks at the company's distributing stations throughout the country.

For information on current delivery and price schedules, contact nearest B&A Sales Office listed below:

Albany	Houston*
Atlanta	Jacksonville
Baltimore*	Los Angeles*
Birmingham*	Minneapolis
Boston	New York*
Bridgeport*	Philadelphia*
Buffalo*	Pittsburgh*
Charlotte*	Providence*
Chicago*	St. Louis*
Cleveland*	San Francisco*
Denver*	Seattle
Detroit*	Yakima (Wash.)

In Wisconsin:
General Chemical Company, Inc.
Milwaukee, Wis.

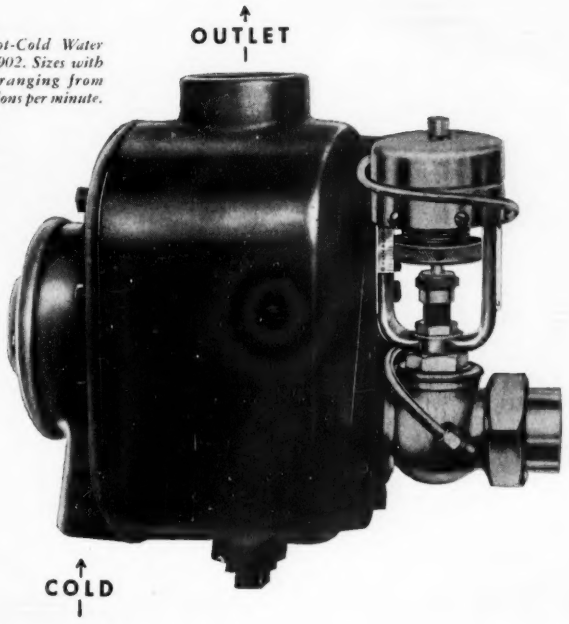
In Canada:
The Nichols Chemical Company, Limited
Montreal* • Toronto* • Vancouver*

* Full stocks B&A products are carried here

BAKER & ADAMSON *Fine Chemicals*
GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

SYLPHON CONTROLS FOR DEPENDABILITY

Sylphon Hot-Cold Water Mixer No. 902. Sizes with capacities ranging from 5 to 131 gallons per minute.



SPECIAL DELIVERY SYSTEM FOR *Constantly* HOT WATER!

Used in
Factories
Office Buildings
Apartment Houses
Hospitals
Schools
Hotels, etc.

for
Gang showers
Needle showers
Continuous baths
Wash fountains
Process water for packing houses, bakeries, dairies, garages, other industries

If you require constant temperature hot water for processing, showers and other operations—see what this thrifty, easily-installed Sylphon Hot-Cold Water Mixer can do to help you.

It uses hot water from any storage tank or instantaneous heater. It regulates the amount of cold water required to temper it to the desired degree. Water is actually mixed together before delivery. Temperature remains constant—even if supply water temperature or pressure fluctuates. Everything works automatically—dependably!

Here's an extra advantage. If either hot or cold water supply fails, the Sylphon Mixer immediately shuts off the remaining supply. When supply is returned, the Mixer starts operating again.

Sylphon Hot-Cold Water Mixers are self-contained, self-powered, ruggedly built. Adjustable temperature range. For complete information, write Department GG.

Temperature Controls • Bellows Devices • Bellows Assemblies

FULTON SYLPHON DIVISION

FIRST WITH BELLOWS

ROBERTSHAW-FULTON CONTROLS CO., KNOXVILLE 4, TENN

Canadian Representatives, Darling Brothers, Montreal

There's a vast difference!

in concentrated citrus oils

The usual methods of producing terpeneless oils involve fractional distillation, or solvent recovery. However, heat does have an adverse effect on the delicate flavor-giving constituents of the oil. Flavor and shelf-life suffer.

Alva ***cold processed*** terpeneless oils are produced by an essentially different principle wherein terpenes and sesquiterpenes are removed simultaneously, leaving the delicate aldehydes, esters, ketones, etc., untouched in their pure natural freshness.

The unadulterated purity and fineness of Alva ***cold processed*** oils are immediately obvious when comparing samples and ***we want to send you a sample***—use the coupon!

ALVA CONCENTRATED CITRUS OILS

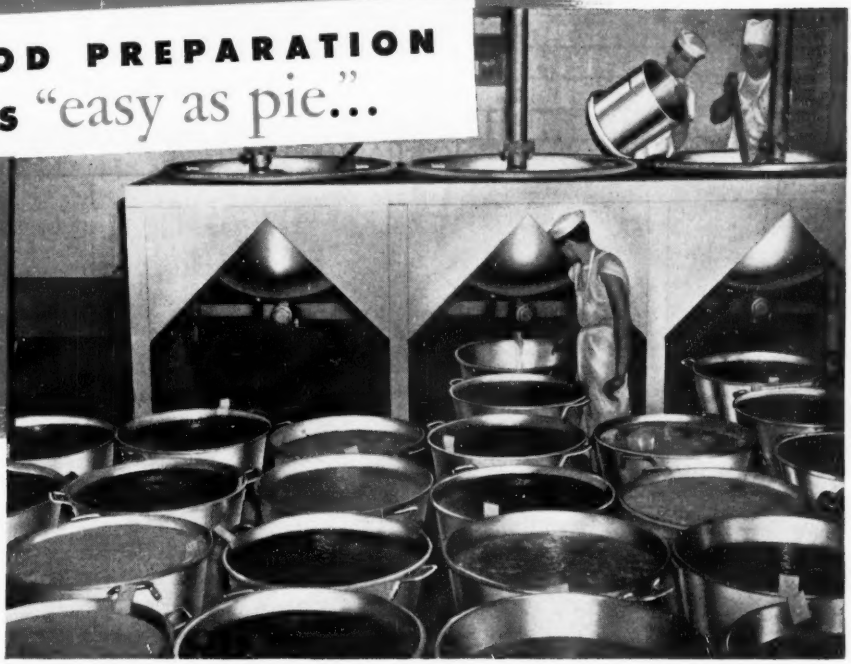
LIME OIL DISTILLED TERPENELESS
OIL LIMES DISTILLED
2X and 4X (wax free)
OIL ORANGE FLORIDA EXPRESSED TERPENELESS
(now in short supply)

ORANGE OIL CALIFORNIA EXPRESSED
2X, 2X (wax free), 5X, 5X (wax free), 10X (wax free)
ORANGE OIL FLORIDA EXPRESSED 5X
OIL LEMON CALIFORNIA EXPRESSED TERPENELESS
OIL LEMON CALIFORNIA EXPRESSED
2X, 2X (wax free), 5X, 5X (wax free), 10X (wax free)

VAN AMERINGEN-HAEBLER, INC.
521 WEST 57th STREET, NEW YORK 19, N. Y.

Alva FLAVORS

FOOD PREPARATION IS "easy as pie..."



Wear-Ever kettles and tubs in use at Real Pie Company, Pittsburgh, Pa.

when you use WEAR·EVER ALUMINUM

Whether your problems concern the handling and storage of foods, or the cooking of foods, Wear-Ever offers an easy-as-pie solution . . . as the Real Pie Company of Pittsburgh found out.

When Wear-Ever Aluminum is used in cooking, it spreads heat so fast, so evenly, that perfect results are assured every time. Wear-Ever Aluminum steam jacketed kettles, for example, are the choice of discriminating food plants just as they are the choice of leading chefs.

In storage and handling equipment, Wear-Ever Aluminum stands alone. Though ruggedly built, it is light to handle and employees like it for that reason. Its sanitary construction meets the strictest codes and regulations. And all Wear-Ever Aluminum steam jacketed kettles and other food plant equipment are made of a super-tough aluminum alloy that cuts plant maintenance costs by outlasting the most optimistic estimates.

For detailed information about the aluminum equipment you need for your plant, mail the coupon today to: The Aluminum Cooking Utensil Company, 304 Wear-Ever Building, New Kensington, Pa.

WEAR-EVER Aluminum

WEAR-EVER ALUMINUM TRADE MARK REG U.S. PAT. OFF.

Standard of Quality for more than 50 years

The Aluminum Cooking Utensil Company
304 Wear-Ever Bldg., New Kensington, Pa.

Please send us full information about your equipment for food processing.

NAME_____

POSITION_____

Fill out this coupon, clip to your letterhead, and mail today.

In virtually ALL phases of Food Processing BECKMAN pH CONTROL is making vital savings like these . . .

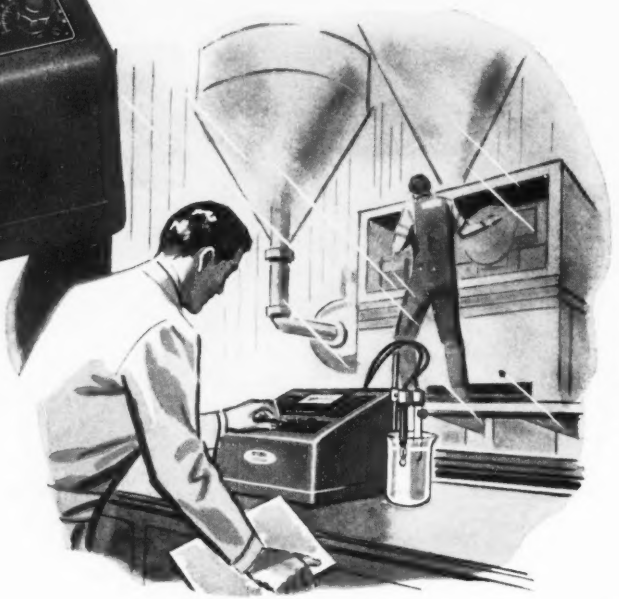
THE BECKMAN MODEL H-2 pH METER is one of a complete range of Beckman pH Meters available for every type of application*. The H-2 is particularly recommended for applications where high accuracy and simple operation—combined with the convenience and low cost of 115-v. AC operation—are desired.

It provides instant and direct pH readings, and a simple, built-in dial permits quick, convenient temperature compensation over the entire range of 0° to 100°C (32° to 212° F.). High reading accuracy is assured by wide-spread dual range scale that reads from 0 to 8 pH or from 6 to 14 pH at the turn of a switch. Same switch also provides instant millivolt readings from 0 to ±800 mv and from +600 to +1400 mv for titrations and oxidation-reduction measurements.

Built-in electrode support and compact case design save valuable space and permit easy portability to various plant locations.

Particularly important is the wide range of factory-sealed, maintenance-free Beckman Glass Electrodes available for use with this instrument . . . electrodes that are virtually unbreakable . . . that cover extreme temperature ranges from below freezing to above boiling . . . that have an unprecedented pH range with negligible errors . . . that are abrasion-resistant and chemically durable to a degree never before thought possible in glass electrodes.

*In addition to the H-2 Meter, other Beckman pH equipment includes completely automatic pH indication and control instruments for large-scale process applications . . . battery-operated models for complete portability in plant and field use . . . and a laboratory type instrument that features maximum versatility and accuracy for research and laboratory applications



Throughout the food industry—in baking, canning, sugar refining, brewing, milk processing and a wide range of other operations—cost-conscious operators are making important savings by Beckman-controlling the pH of their processes. Some of the many benefits resulting from Beckman pH Control include:

- **. . . better quality, greater uniformity, fewer rejects in the baking of crackers, bread and other bakery products.**
- **. . . improved fermentation control in brewing, wine making and distilling processes.**
- **. . . better quality and flavor in a wide range of dairy processing and cheese making operations.**
- **. . . more accurate control of flavor and quality, better jel consistency, in jam and jelly making.**
- **. . . improved sterilization, flavor and quality in various canning and preserving operations.**
- ***. . . and valuable savings in time and processing costs in many other food processing operations.***

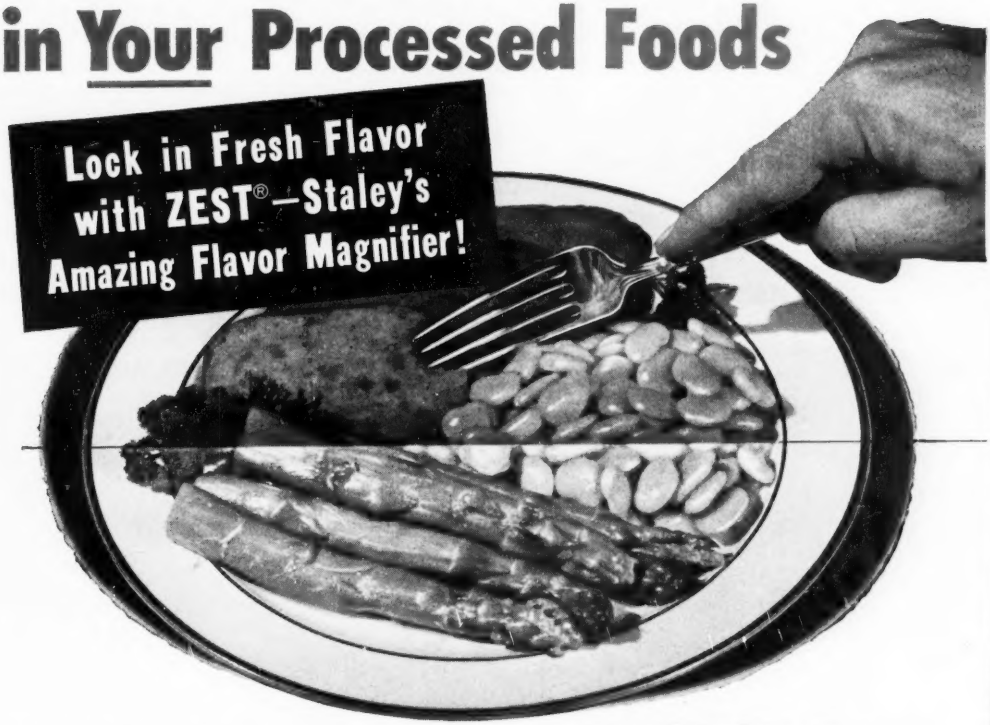
If you have not yet investigated the savings Beckman pH Control can make in your particular food processing operations it will pay you to discover what others—possibly your own competitors—are doing to cut costs, improve quality and enhance flavor and marketability with the aid of Beckman pH Instruments.

The Beckman Model H-2 pH Meter illustrated above is ideal for most food processing plants because of its high accuracy, its inexpensive AC operation and its simple direct-reading convenience. Let our trained engineers show you how this instrument can quickly pay for itself and produce year-round savings in your operations. For further details see your nearby authorized Beckman dealer—or write direct. **Beckman Instruments, National Technical Laboratories, South Pasadena 18, Calif.**

BECKMAN INSTRUMENTS
control modern industries

Beckman Instruments: pH Meters and Electrodes — Spectrophotometers — Radioactivity Meters — Special Instruments

Don't Let Flavors "Fade" in Your Processed Foods



When food flavors "fade" due to processing . . . sales "fade" as well. Guard the flavor, the *basic sales appeal* of your soups, vegetables, poultry, meats and seafoods this *proven* way. Discover . . . as hundreds of food processors already have done . . . the amazing flavor miracle that takes place when you add ZEST Monosodium Glutamate to your foods. ZEST "locks in" every last bit of delicious, natural food flavor present in your foods. It guards and maintains this natural flavor goodness right to your customers' table!

Put this top processed food salesman to work in your products. ZEST adds no flavor, aroma or color of its own . . . it simply magnifies and holds the fresh natural flavor of foods in which it is used. Economical too—this pure vegetable protein requires as little as 0.2% by weight for most foods to work its flavor miracles!

ZEST

STALEY'S MONOSODIUM GLUTAMATE

A. E. STALEY MFG. CO. • DECATUR, ILLINOIS

World's Largest Producer of Corn and Soybean Products

USE INSTANTLY SOLUBLE 99+% PURE ZEST BEFORE, DURING OR AFTER PROCESSING—IT REQUIRES NO FORMULA CHANGES!

End sales-robbing flavor "fading" once and for all! Try ZEST in your foods just once...you'll consider it one of your most important ingredients.

RUSH COUPON NOW FOR FREE FACTS!

A. E. STALEY MANUFACTURING CO.
Industrial Sales Department, Dept. FE-4, Decatur, Ill.

Gentlemen: Please send me complete information so I can prove to myself how it keeps flavors from "fading."

☐ Have a Staley Flavor Expert call on me.

Name ..... Title .....

Company .....

Address .....

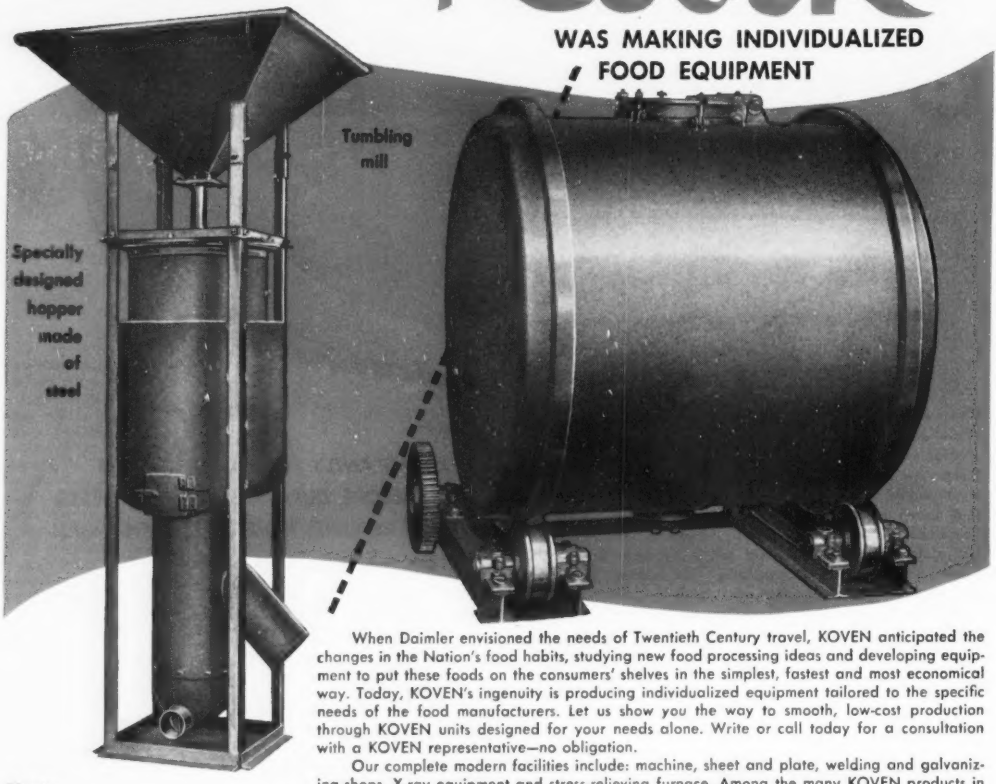
City and State .....

EACH IN THE 1890's

WHEN DAIMLER
INVENTED THE FIRST
GASOLINE-DRIVEN AUTOMOBILE

Koven

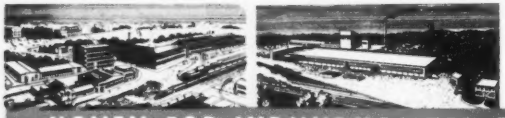
WAS MAKING INDIVIDUALIZED
FOOD EQUIPMENT



When Daimler envisioned the needs of Twentieth Century travel, KOVEN anticipated the changes in the Nation's food habits, studying new food processing ideas and developing equipment to put these foods on the consumers' shelves in the simplest, fastest and most economical way. Today, KOVEN's ingenuity is producing individualized equipment tailored to the specific needs of the food manufacturers. Let us show you the way to smooth, low-cost production through KOVEN units designed for your needs alone. Write or call today for a consultation with a KOVEN representative—no obligation.

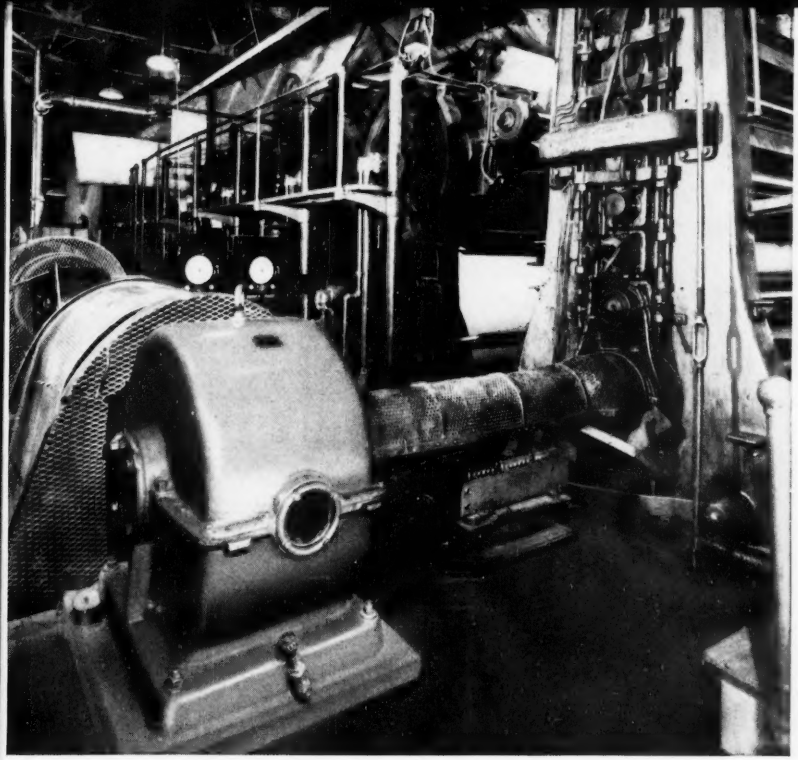
Our complete modern facilities include: machine, sheet and plate, welding and galvanizing shops, X-ray equipment and stress-relieving furnace. Among the many KOVEN products in all commercial and non-corrosive metals: Stainless Steel; Aluminum Sheet Fabrication; Boxes, Tote, Waste Cans; Chemical Apparatus; Coils and Pipe Bands; Copper Sheet Fabrication; Galvanizing Work; Mixers, All Kinds; Monel Metal Fabricators; Pails, Special Heavy; Pans, All Types, All Metals; Sinks, Scullery and Factory; Tables, Galvanized or Monel; Tanks, All Types, All Metals; Kettles, All Types, All Metals. Fabrication to A.S.M.E. Code Par. U-68 and U-69 a specialty.

Plants:
Jersey City, N. J.
Dover, N. J.



L. O. KOVEN & BRO., INC.
154 Ogden Avenue, Jersey City 7, N. J.

KOVEN FOR INDIVIDUALIZED FOOD EQUIPMENT SINCE 1881



What's YOUR problem?

R. R. Rowlands of Standard Oil's La-Crosse, Wisconsin, office is the lubrication specialist who helped this midwest paper mill (see left) solve a serious problem by recommending STANOGEAR EP Lubricant.

Standard's lubrication specialists are located throughout the Midwest. One of them is within easy reach of your plant. You can contact him simply by phoning your local Standard Oil Company (Indiana) office. His experience and special training will help you get maximum benefits from STANOGEAR EP Lubricant and other outstanding products such as:

SUPERLA Greases—Available in a wide range of consistency grades and in both lime-soap and soda-soap types. SUPERLA Greases cover a wide range of operations. These efficient products are comparable in quality with the highest type of special greases.

STANOLITH Greases—Because these unique lithium soap products possess the heat resistant properties of soda-soap greases and the water resistant properties of lime-soap greases, they offer a solution to lubrication problems caused by the presence of both heat and water.

CALUMET Viscous Lubricants—On open gears and wire rope, these greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of gears, better lubrication of wire rope.

STANORUST Rust Preventives—The eight grades of STANORUSTS form one of the most complete and effective lines of rust preventives on the market today. Each has been scientifically and specifically developed for its intended use. The grades range from a fingerprint remover to a heavy grease type product that protects against corrosion for years under the most severe outdoor exposure.

Helps gear units keep their teeth...

HEAVIER LOADS and higher speeds brought trouble to 16 large gear units used for driving paper machines at a midwest paper mill. Under the more punishing conditions of temperature and pressure, the lubricant in the gear sets deteriorated rapidly and had to be replaced every three to four months. Of even greater concern to plant operators was the pitting of gear teeth surfaces—a real threat to uninterrupted operation of paper machines and to plant economy.

The problem was put to a Standard Oil lubrication specialist. He pointed out that the lubricant in use did not have the extreme-pressure characteristics necessary to maintain strong, protective films of oil in the face of high gear loads. Upon his recommendation, the gear cases were drained and cleaned, then filled with STANOGEAR EP Lubricant.

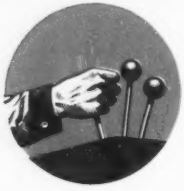
In two years of continuous operation—24 hours a day and 6 days a week—the original fills of STANOGEAR EP have shown no appreciable deterioration and have not needed to be replaced. Plant officials report that the gears show no measurable wear, that pitted surfaces are polished and in excellent condition, and that gear cases are clean.

STANOGEAR EP
REG. U. S. PAT. OFF.
Lubricant

Why not utilize the Standard Oil service employed so successfully by this company? The combination of expert engineering and high quality products can help you solve a specific problem or gain greater all-around economy. How you can put this service to work for you, quickly and easily, is explained at the right.

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD **STANDARD OIL COMPANY (INDIANA)**



A LIGHT PULL AND YOU GO!

High power ability does it . . . the instant surge of power you get in a battery-electric truck that's Exide-Ironclad equipped. And it's finger-tip-control power . . . meets *all* demands in *stop-and-go, lift-and-shift* operations . . . plus split-second handling, easy maneuvering, accurate spotting. Exide-Ironclad Batteries also give you:

ROUND-THE-CLOCK PERFORMANCE—no mechanical troubles, no unscheduled down time.

UNIFORM SPEED straight through to end of shift.

LOW OPERATING COSTS—on the average of 4 cents an hour for power . . . batteries absorb a very high percentage of charging current.

LOW MAINTENANCE COSTS—seldom more than 15 cents per shift.

EXCEPTIONALLY LONG LIFE—proved on more than 100,000 heavy-duty jobs.

INHERENT SAFETY—freedom from the hazards of fire, fumes, noise and uncleanliness.

There are Exide-Ironclad Batteries for every size and make of battery-electric truck.

Write for your FREE copy of the new Exide-Ironclad Battery Motive-Power Catalog, Form 5161.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 2
Exide Batteries of Canada, Limited, Toronto
"Exide-Ironclad" *Reg. Trade-mark U. S. Pat. Off.*

1888 . . . DEPENDABLE BATTERIES FOR 63 YEARS . . . 1951

FOR FOOD PLANT CLEANING

Solvay offers you a superior line of cleansers for the food plant. Whatever your needs may be, you may be sure that there is a Solvay cleaning product to fit them. You may be sure, too, of the quality of these products . . . for Solvay is America's oldest and largest producer of alkalies and associated chemicals. For cleansers of dependable quality, specify Solvay.

for General Cleaning

New! Improved!

1 CLEANSER No. 600

A new, greatly improved formulation of one of America's best known general maintenance cleansers. Five modern ingredients combine their special properties to make "tough" cleaning jobs easier, more economical.

2 CLEANSER No. 615

A brand new cleanser of the 600 series, Cleanser No. 615 provides more detergent action for more difficult cleaning jobs. Specially developed for hard water, this product substantially cuts cleaning costs in these areas.

3 NYTRON*

Solvay's new, exclusive wetting agent-detergent. Not an alkali, not a soap, not a mixture. Exceptional detergency and rinsability—in hot or cold, hard or soft water—combined with mildness and safety give Nytron a wide variety of uses in the food plant. It will not dull painted or polished surfaces . . . use it for regular cleaning of equipment, floors, walls, windows, trucks, etc.

4 GREEN LABEL COMPOUND

A new, low-cost, high-performance general cleanser. Contains the most modern materials, including a special wetting agent. Provides exceptional performance at a low price.

5 SUPERSHEEN*

Sets a new standard for machine dishwashing performance. Excellent in hard or soft water. Prevents the formation of lime scale, keeps the machine and spray jets clean. Safe for tin and aluminum utensils; wonderful for removing baked-on soil.

for Special Cleaning

6 SCOURING CLEANSER

A Solvay cleanser for stubborn soil. In addition to abrasive action, this product has excellent wetting, penetration and rinsability.

7 CAN WASHING CLEANSER

A brand new Solvay cleanser for machine can washing. Particularly effective for baking pans, dairy cans, mixing vessels, etc.

for Heavy Duty Cleaning

8 CAUSTIC SODA

A basic alkali from America's oldest and largest producer. High pH and high neutralizing value give Solvay Caustic Soda "bite" that will do the most difficult cleaning jobs with highest efficiency.

for Bottle Washing

9 ANCHOR ALKALI

One of America's largest selling bottle washing cleansers because it produces bright, sparkling-clean bottles at minimum cost. Anchor Alkali sterilizes effectively and rinses quickly and completely.

10 ACE ALKALI

Solvay's brand new bottle washing cleanser. A premium product for premium performance . . . Ace Alkali produces exceptional results in the most difficult bottle washing operations and with the hardest water.

11 SPECIAL FLAKE ALKALI

For hydro and spray type bottle washing equipment, where foaming is a problem, specify Solvay Special Flake Alkali for best results.

*REG. U. S. PAT. OFF.

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FOR FREE SAMPLES AND LITERATURE

Detailed literature and samples of all these Solvay products are available without any cost or obligation. Here's all you need do—tear out this coupon; put a check mark next to the products in which you are interested . . . print your name and your company name and address in the space below . . . and mail the coupon to us. Your samples and literature will be sent promptly. Don't delay—mail this coupon today!

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐
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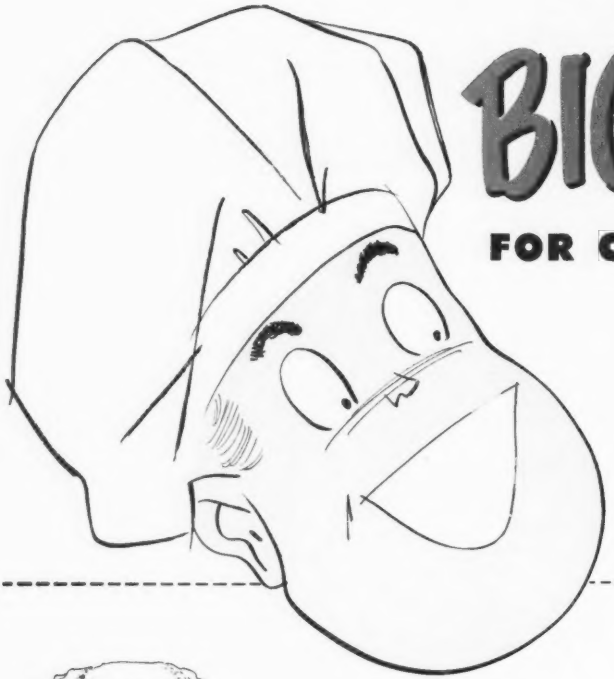
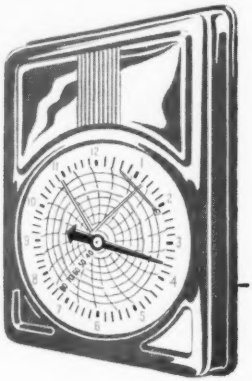
SOLVAY SALES DIVISION
Allied Chemical & Dye Corporation
40 Rector Street, New York 6, N. Y.

BIG NEWS

FOR CAKE BAKERS





Flo-Sweet engineers have designed and installed a liquid sugar system that controls the temperature of cake batter.

In use in one of the foremost bakeries in the country, the new Flo-Sweet installation includes special refrigeration and circulation equipment that continuously and thermostatically controls the temperature of the liquid sugar from storage tank to mixing bowl.

Mechanical delivery of sugar to the mix has always been recognized as the ideal solution of a serious bakery plant transportation and handling problem. This has been overcome by automatic pumping so that bakers, too, can get the tremendous savings other commercial sugar users have long enjoyed. Now 3 simple mechanical steps can replace 10 costly manually handled operations, saving time, manpower and money at every single mixing bowl in your plant!

For further information about this latest example of Refined Syrups & Sugars' pioneering in liquid sugar use, drop us a line.

flo-sweet

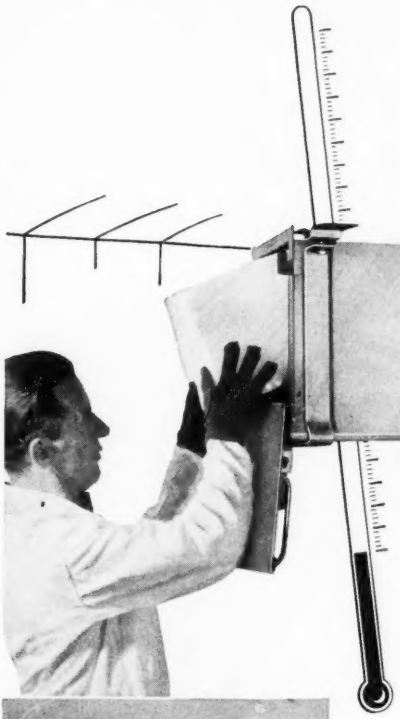
Manufactured only by

REFINED SYRUPS & SUGARS, INC.

Yonkers 1, New York

PIONEERS IN LIQUID SUGAR FOR SAVINGS, SANITATION AND SERVICE

FOSTER-BUILT
Dry Ice Truck Bunkers

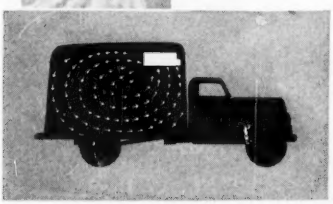


AS LOW AS
ONLY $61.00
Plus Fed. Excise Tax

Low Initial Cost
Low Installation Cost
Low Maintenance Cost
High Refrigerating Efficiency

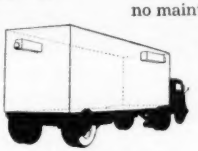
The Foster-Built Dry-Ice Truck Bunker is the new, low-cost way to effective truck refrigeration. This unit puts to most efficient use all the temperature-reducing qualities of Dry Ice. The bunker is constructed so that the Dry Ice rests directly over a 2-inch bottom air duct. The Dry Ice chills the metal top plate of the air duct, and a low-amperage sirocco-type fan forces the air along the length of the chilled plate, effectively lowering the temperature of the air. The chilled air is then circulated throughout the truck.

The cost of the Foster-Built Dry-Ice Truck Bunker is but a fraction of the cost of most mechanical and other types of truck refrigeration units, and the placement of four bolts is all the installation required. The units are light in weight and permit increased payloads. Virtually no maintenance is required.



Tests on route trucks have shown that Foster-Built Dry-Ice Truck Bunkers maintain desired temperatures more than 18 hours with as many as 30 to 40 door openings.

Transport trucks with Foster-Built Dry-Ice Truck Bunkers have gone as long as 72 hours under moderate weather conditions without re-icing. Bunkers are available in 2-block and 4-block sizes.



Typical bunker installation in transport truck

IDEAL FOR FLEET AND INDIVIDUAL TRUCK OPERATORS

The Foster-Built Dry-Ice Truck Bunker has proved to be an effective, low-cost means of refrigeration for both fleet and individual operators. Units are easily removed when refrigeration is not required and in fleet operation may be moved from truck to truck.

For complete information on this new low cost refrigeration method, send in coupon today or call MOnroe 6-6880 in Chicago.

DON'T TAKE CHANCES

A Foster-Built Dry-Ice Truck Bunker is foolproof and eliminates the danger of loss through mechanical breakdown. For better refrigeration at lower cost, investigate Foster-Built Dry-Ice Truck Bunkers now.

GET THE FACTS...MAIL THIS COUPON TODAY!

FE-1

Foster-Built Bunkers, Inc.
757 W. Polk Street, Chicago 7, Illinois

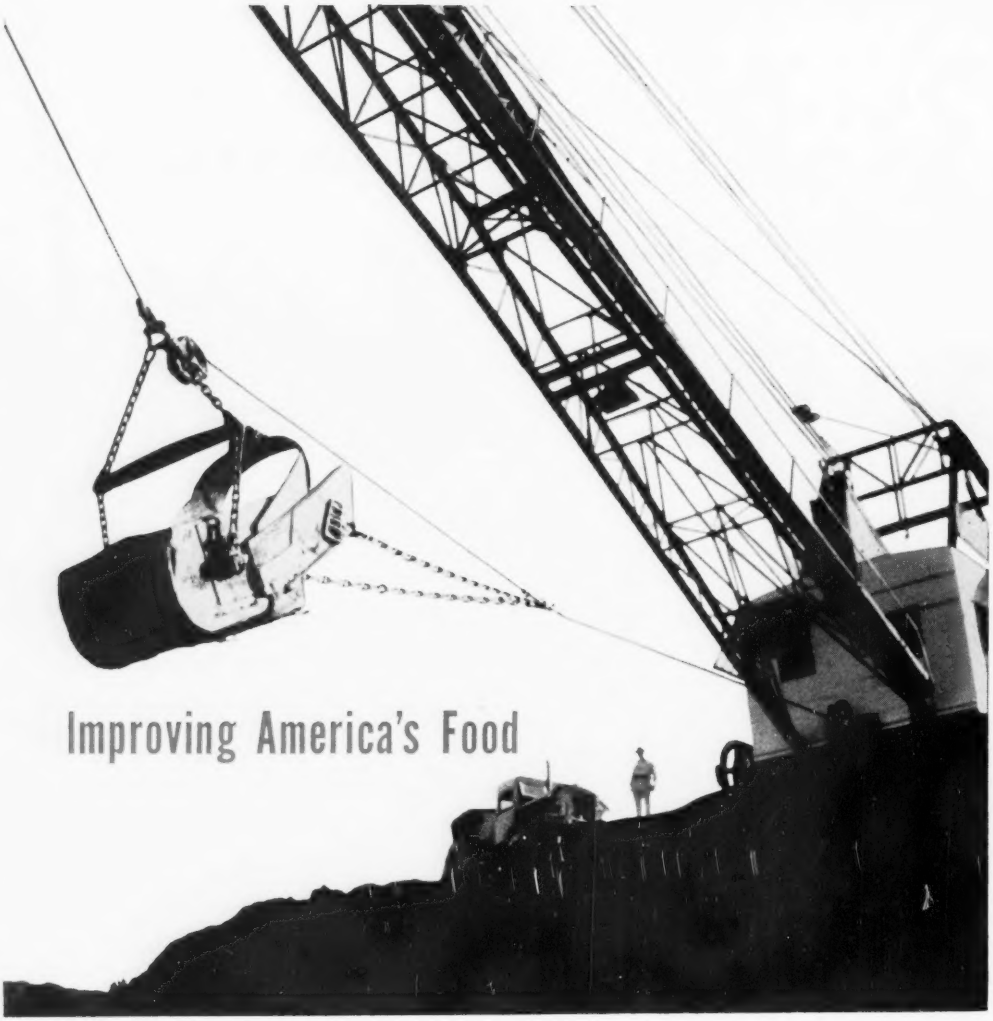
Gentlemen: Please send me fully illustrated, free booklet giving complete information and "case histories" of Foster-Built Dry-Ice Truck Bunkers.

Name .....

Company .....

Address .....

City ..... Zone ..... State .....



A monstrous dragline scoop takes a ten-cubic-yard bite of reddish-brown earth . . . a bite that improves America's food.

The mechanical dinosaur is mining phosphate ore in Monsanto's ore beds in Tennessee. At a nearby electric furnace plant, Monsanto processes the ore to produce elemental phosphorus of better than 99.9% purity.

From this *pure* phosphorus, other Monsanto plants make phosphoric acid and phosphates for leavening and food fortification. Manufactured by modern methods, including strict laboratory control, these food-grade chemicals have the uniformity and superior quality synonymous with Monsanto.

Monsanto Research strives constantly to improve chemicals for the food industry, and, in the Monsanto Food Technology Laboratory, to find better ways to use them. MONSANTO CHEMICAL COMPANY, Phosphate Division, 1700 South Second Street, St. Louis 4, Missouri.

Monsanto Chemicals for the Food Industry

Phosphoric Acid—75% food grade and 85% N.F.

Phosphate Leavening Agents—Sodium acid pyrophosphate, MD grade. Sodium acid pyrophosphate. Calcium phosphate, mono.

Calcium Supplements—Calcium phosphate, di, dihydrate. Calcium phosphate, di, anhydrous. Calcium phosphate, tri. Calcium pyrophosphate (normal).

Iron Supplements—Sodium ferric pyrophosphate. Ferric orthophosphate.

Nutrient Salts—Ammonium phosphate, di. Ammonium phosphate, mono.

Emulsifiers for Food Processing—Sodium phosphate, di. Sodium pyrophosphate, tetra.

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

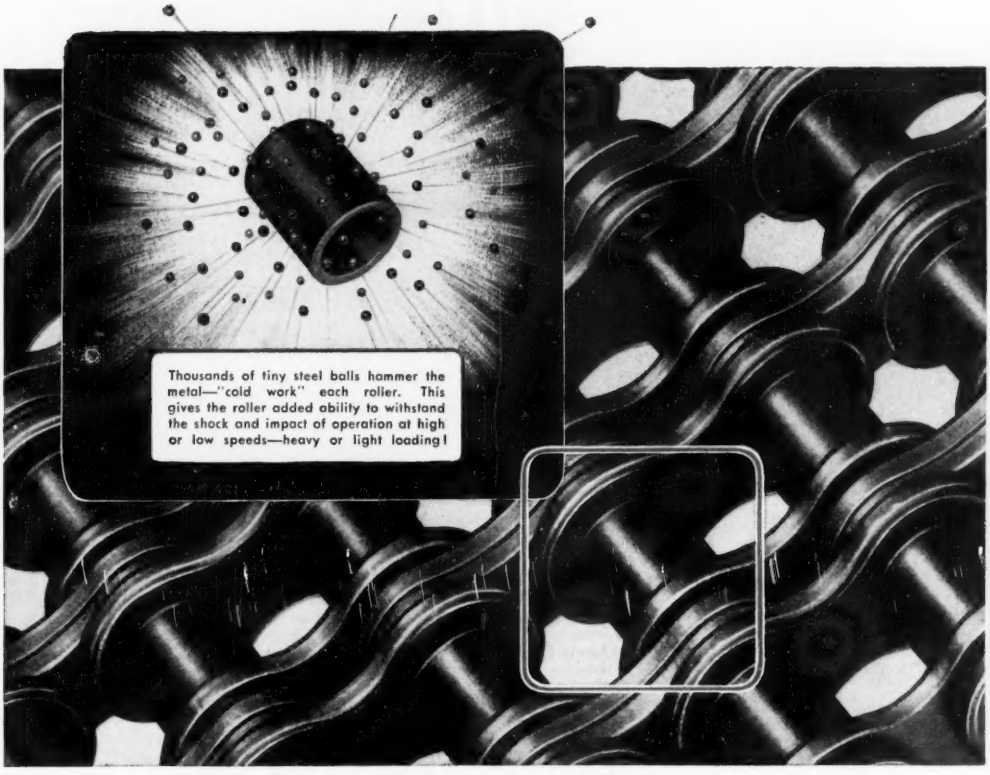
MONSANTO
CHEMICALS — PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

Get the roller chain with rollers that are

SHOT PEENED

for EXTRA fatigue life!


Thousands of tiny steel balls hammer the metal—"cold work" each roller. This gives the roller added ability to withstand the shock and impact of operation at high or low speeds—heavy or light loading!

You get this added feature in every LINK-BELT Roller Chain

You get absolute uniformity, too. No highs. No lows. Just smooth, flowing dependable chains that pay off in wide flexibility—greater performance—longer life.

You see, LINK-BELT Roller Chains are made from carefully selected materials with controlled heat treatment to assure uniformity and absence of weak members, then—rollers are shot peened to give them the extra fatigue life needed for today's higher speeds and heavier loads.

Link-Belt Roller Chain is available in single or multiple widths, in $\frac{3}{8}$" to 3" pitch and double pitch. If you have a roller chain problem, see the LINK-BELT engineer nearest you.

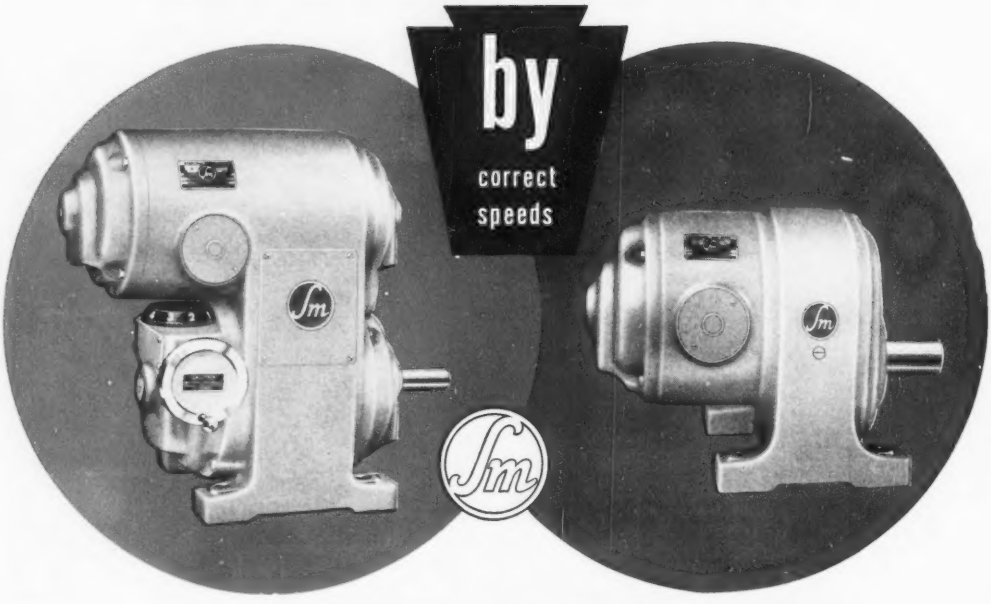
LINK-BELT

ROLLER CHAINS and SPROCKETS

LINK-BELT COMPANY, Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Johannesburg. Offices, Factory Branch Stores and Distributors in principal cities. 12.207

power modernization

conserves man power and materials...



Ask for your copy of pictorial bulletin No. D-60, showing Sterling Electric Power Drives Turning The Wheels of Industry.

STERLING SPEED-TROL

. . . GIVES YOU VARIABLE SPEED CONTROL NECESSARY FOR:

PROCESS CONTROL OF: Temperature—viscosity—level—pressure—flow—etc.

TIME CONTROL OF: Baking—drying—heating—cooking—pasteurizing—soaking—chemical action—etc.

EQUIPMENT ADAPTATION TO: Load variation—sequence synchronization. Size—tension—hardness or shape of materials to be processed—machined—conveyed—blended—mixed—etc.

VARIATIONS IN: Quality—quantity—operators' abilities—etc.

STERLING SLO-SPEED

. . . GIVES YOU THE ONE BEST SLOW SPEED AND:

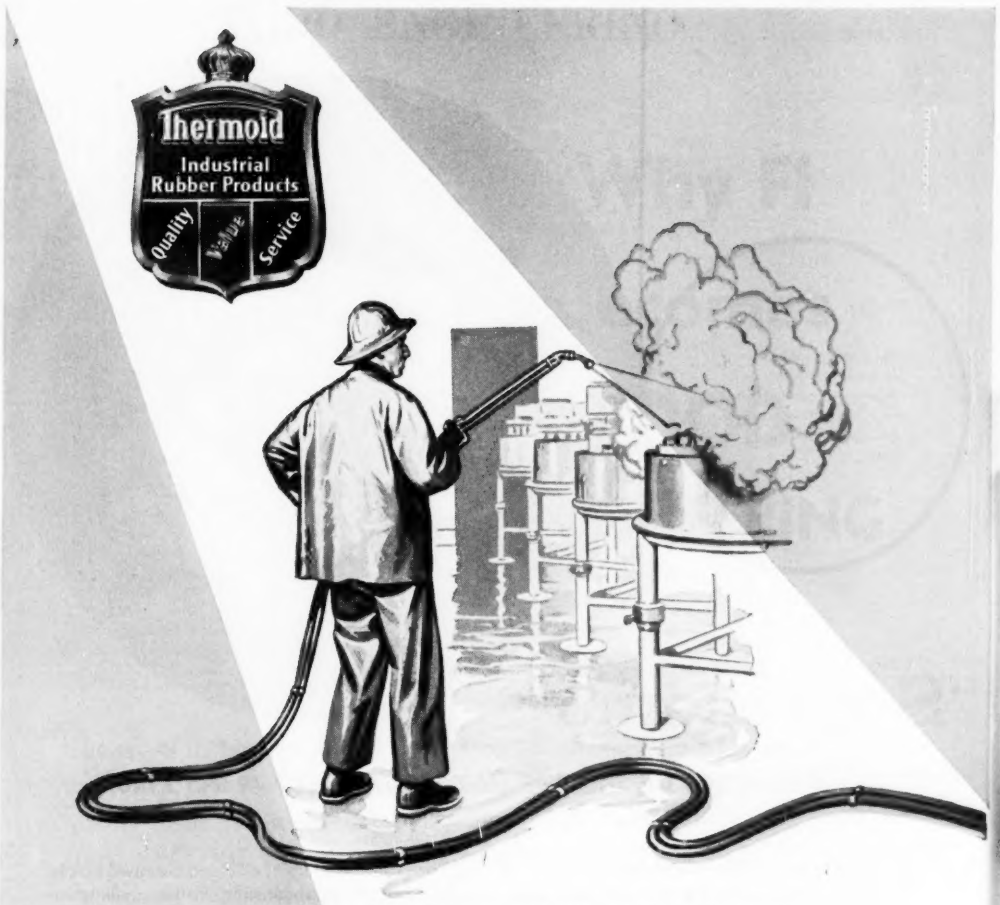
gives uninterrupted service—provides versatile mounting and flexibility in arrangement of machinery—saves valuable space—provides greater safety—costs less to install and use. An indispensable source of slow speed power for:

Agitators	Cookers	Kilns	Pumps
Blenders	Dryers	Mills	Screens
Blowers	Feeders	Mixers	Tumblers
Conveyors	Filters	Presses	Etc., etc., etc.

STERLING ELECTRIC MOTORS

Plants: New York 51, N. Y.; Los Angeles 22, California; Hamilton, Canada; Santiago, Chile.

Offices and distributors in all principal cities.



Hose built for the job! That's the reason for Thermoid's excellent reputation among users of hose.

Our customers know they can rely on Thermoid's recommendations for their requirements . . . whether it's for air, water, steam, creamery, brewers, suction, or the new multi-purpose Versicon hose—all built for the food processing industry.

And men who buy these quality products like the service they get from Thermoid's experienced distributors and sales representatives—and their intimate knowledge of the *buyer's* problems.

Get the hose built for *your* job. Specify Thermoid.

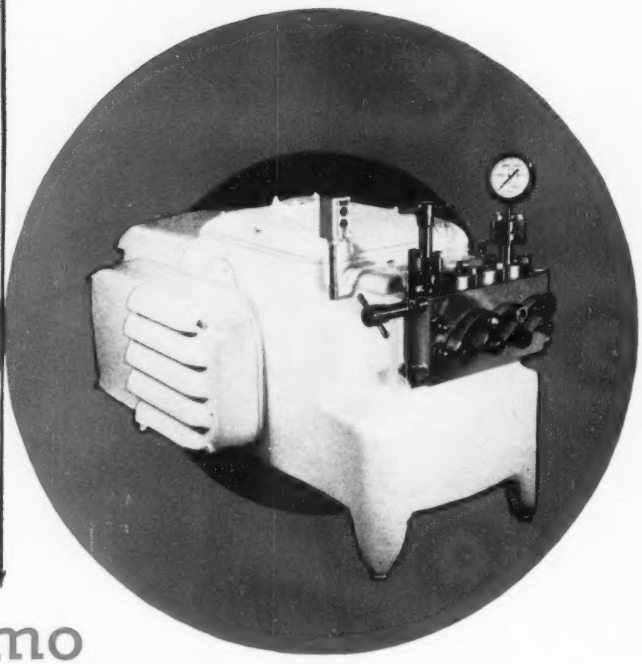
Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Thermoid

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

For a finer product — at lower cost — use the Superhomo, industry's finest and most sanitary homogenizer. Capacities from 50 to 2500 g.p.h.



"Superhomo

. . . is doing an Outstanding Homogenizing Job in Our Plant"

. . . that's typical of the reports we're receiving these days as more and more food plant operators discover the outstanding job Superhomo is doing on flavors, extracts, starch slurries, syrups, fruit and vegetable juices, beverages, confectionery products and many others.

They have discovered that the Superhomo is the modern way to achieve the advantages of homogenization — improved product quality, taste and appearance. Superhomo is the industry's choice because of its many exclusive and superior features that assure the best in homogenizing performance.

For example: simple, efficient, patented single or two-stage homogenizing valve gives complete control of viscosity and assures emulsion stability. Patented solid stainless steel cylinder block is sanitary . . . easily cleaned and corrosion resistant. The Superhomo has a rugged, compact frame and drive mechanism, designed to give many years of trouble-free operation.

Call the Cherry-Burrell representative nearest you and ask him to help you plan now. And order now so that material shortages and delayed deliveries won't affect your plans for a better product tomorrow.

CHERRY-BURRELL CORPORATION
General Sales and Executive Office:
427 W. Randolph Street, Chicago 6, Ill.
Milk and Food Plant Equipment and Supplies
FACTORIES, WAREHOUSES, BRANCHES, OFFICES OR DISTRIBUTORS AT YOUR SERVICE IN 36 CITIES

trendmaker in a great industry

Cherry-Burrell Corporation
Dept. 117, 427 W. Randolph St.
Chicago 6, Illinois

☐ Send new Superhomo Bulletin

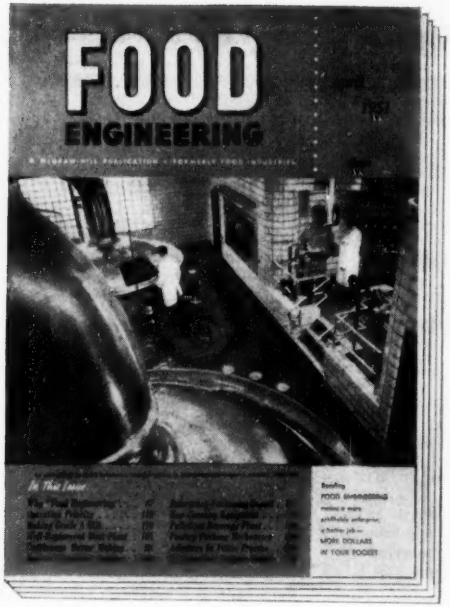
☐ Have representative call

Name .....

Firm .....

Address .....

City ..... State .....



Why FI Becomes FOOD ENGINEERING

The trend in food processing is toward better-engineered processes, equipment, premises, products and packages. The reason—To produce quality foods at lower relative cost. Food Industries goes with the trend, and FOOD ENGINEERING is dedicated to accelerating it for the benefit of the industry and the public

Frank K. Lawler
Editor, "Food Engineering"

As announced in the March FI, and as you see by the cover of this issue, the name of your magazine has been changed to FOOD ENGINEERING.

You and others in the industry are responsible for the change. Those directing the operations of the industry have been applying engineering at an ever-accelerating rate to products, processes, packaging, storage and distribution—as well as to quality control, sanitation and plant design.

By keeping in step with your achievements and your requirements, your magazine necessarily has become a publication devoted to Food Engineering. And as we look ahead, we can see very clearly that you and other food men will utilize engineering to much greater extent. This you will do as the way to produce better products at lower relative cost and in increased volume.

We intend to keep on serving your needs for information which will help you to solve your problems and to make progress through improvements in methods and facilities.

So we have decided to call your magazine by the name which indicates what it is, and will continue to be—FOOD ENGINEERING.

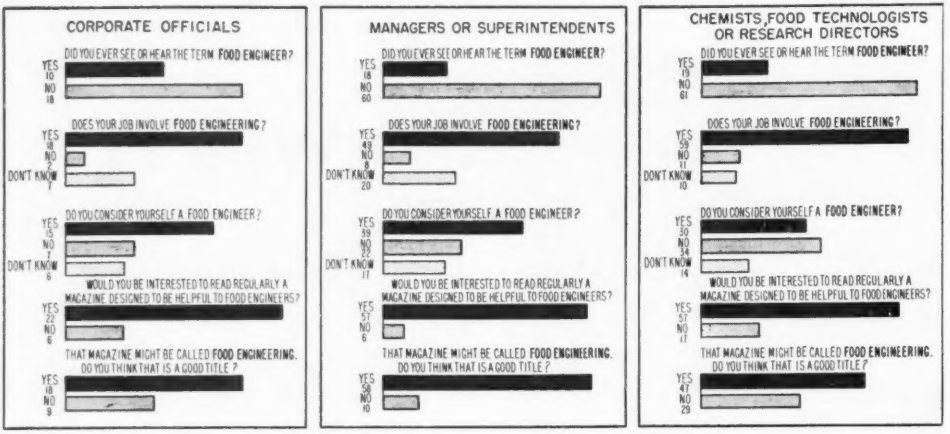
Our Policy and Purpose

In changing the name, we are not departing from our original concept of the type of magazine needed to best serve the present and future needs of men who direct the operations and progress of food processing companies. The following statement of policy and purpose appeared on the front cover of the very first issue of FOOD INDUSTRIES, the October, 1928, number:

"Food manufacturers have a common interest in satisfying human hunger and thirst. But in their manufacturing operations they have another community of interest which, while not so apparent, has a direct bearing on methods of production. It lies in the fact that the same processes, based upon the same fundamental principles, are applied in making a variety of food products.

"This, in turn, means that the progressive production man in one branch of the food industry can adapt to his own operations the ideas, processes and mechanical equipment of other branches. This is true, however, only if the operator has a medium of information through which he can view the whole field of food production and keep abreast of technical developments in branches other than his own.

Engineering Thinking of Men in the Food Processing Industry


CORPORATE OFFICIALS
DID YOU EVER SEE OR HEAR THE TERM FOOD ENGINEER?
YES 10
NO 18
DOES YOUR JOB INVOLVE FOOD ENGINEERING?
YES 18
NO 4
DON'T KNOW 1
DO YOU CONSIDER YOURSELF A FOOD ENGINEER?
YES 15
NO 7
DON'T KNOW 6
WOULD YOU BE INTERESTED TO READ REGULARLY A MAGAZINE DESIGNED TO BE HELPFUL TO FOOD ENGINEERS?
YES 22
NO 6
THAT MAGAZINE MIGHT BE CALLED FOOD ENGINEERING. DO YOU THINK THAT IS A GOOD TITLE?
YES 18
NO 9
MANAGERS OR SUPERINTENDENTS
DID YOU EVER SEE OR HEAR THE TERM FOOD ENGINEER?
YES 18
NO 60
DOES YOUR JOB INVOLVE FOOD ENGINEERING?
YES 49
NO 9
DON'T KNOW 20
DO YOU CONSIDER YOURSELF A FOOD ENGINEER?
YES 39
NO 22
DON'T KNOW 17
WOULD YOU BE INTERESTED TO READ REGULARLY A MAGAZINE DESIGNED TO BE HELPFUL TO FOOD ENGINEERS?
YES 57
NO 6
THAT MAGAZINE MIGHT BE CALLED FOOD ENGINEERING. DO YOU THINK THAT IS A GOOD TITLE?
YES 58
NO 10
CHEMISTS, FOOD TECHNOLOGISTS OR RESEARCH DIRECTORS
DID YOU EVER SEE OR HEAR THE TERM FOOD ENGINEER?
YES 19
NO 61
DOES YOUR JOB INVOLVE FOOD ENGINEERING?
YES 59
NO 11
DON'T KNOW 10
DO YOU CONSIDER YOURSELF A FOOD ENGINEER?
YES 30
NO 34
DON'T KNOW 14
WOULD YOU BE INTERESTED TO READ REGULARLY A MAGAZINE DESIGNED TO BE HELPFUL TO FOOD ENGINEERS?
YES 57
NO 17
THAT MAGAZINE MIGHT BE CALLED FOOD ENGINEERING. DO YOU THINK THAT IS A GOOD TITLE?
YES 47
NO 29

"It is to develop this common bond of interest, to exemplify these common production processes, to make available to the whole industry the best practices of each branch, that this magazine is established. It will be a common meeting ground for the exchange of ideas between production men, equipment manufacturers and producers of miscellaneous supplies.

"This is the policy; the corresponding purpose is to increase production efficiency and promote business success in the food industries."

In the 22½ years during which this policy has been carried out, FOOD INDUSTRIES has been read by progressive processors in all branches of the industry, a fact that demonstrates the soundness of its policy and purpose and its value to men in the industry.

Added Service to Readers

With this success, with the growth of the industry, and with the accelerated application of technical and engineering principles, the magazine also has grown. There were 50 editorial pages in October, 1928. Now the average issue contains 100 editorial pages.

This doubling of the size of the editorial content has made a tremendous difference in the ability of the magazine to serve the needs of readers. It has provided space for the publication in each issue of information on many different branches of the industry.

This means that the magazine has added significantly to its original service. It has added to its broad common-denominator content much information in each issue that directly applies to each major branch of the industry. This additional information is at the same time a service to all branches because it involves Food Engineering, the great common denominator of the food processing field today.

Still More Feature Pages

FOOD INDUSTRIES has been serving this dual function for some time. But under the title FOOD ENGINEERING, it will do an even better job. And here's why.

After careful and extensive surveys of the needs and preferences of individuals in the industry, we are eliminating some departments and shortening others to make available more pages for the types of information of greatest value to men in food plants. This gives us 60 or more pages of feature articles in each issue, and it also permits us to devote more space to high-interest departments such as New Equipment and Supplies and Practical Ideas.

You will notice in this issue, too, a new arrangement of the various editorial sections. This rearrangement was adopted for two reasons. First, to enhance the convenience of the magazine to readers. Second, to solve the physical problem of accommodating more feature articles in each issue. We believe we have achieved a layout that will take the reader through the issue along a more interesting course.

These changes stem from our policy of continually improving the magazine to keep it on the beam of reader requirements. And we shall not stop here. Further refinements are planned. And with the trends in the industry and the interests of readers as guides, we shall continue to keep pace with your need for reliable information that will help you to lower costs and improve quality. Such information will assist you in making your own job more effective and the food processing enterprise with which you are connected more profitable.

Engineering Thinking Revealed

Before we adopted the name FOOD ENGINEERING, we questionnaired typical readers to determine their reactions to the term. And we present some of the results of this survey, because they demonstrate a strong trend to Food Engineering in the thinking of people in the industry.

To make certain that we had a true concensus, a questionnaire was mailed to men with different types of position and responsibility. Included were corporate officials; managers and superintendents; chemists, food technologists and research directors; engineers; and others.

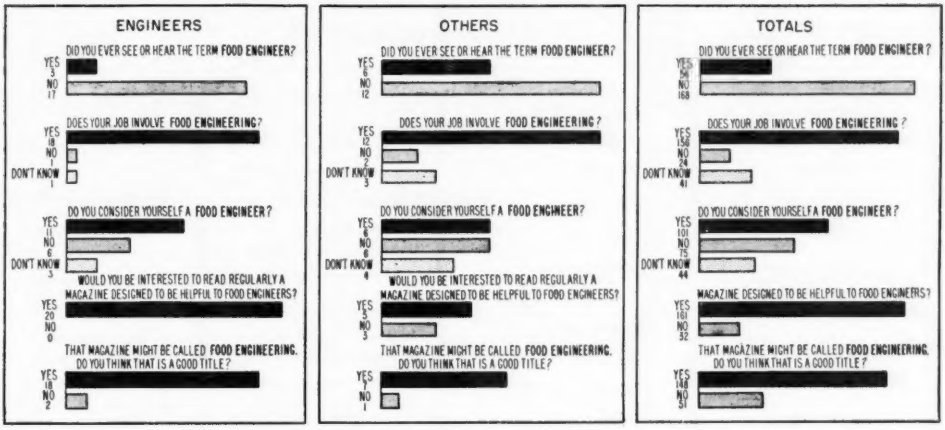
The questionnaire asked these questions:

1. "Did you ever see or hear the term 'Food Engineer'?"
2. "What are (or what would you assume to be) the functions and interests of a Food Engineer?"
3. "Does your job involve Food Engineering?"
4. "Do you consider yourself a Food Engineer?"
5. "Do you believe you would be interested to read regularly a magazine designed to be helpful to Food Engineers?"
6. "That magazine might be called 'Food Engineering.' Do you think that is a good title?"

The answers from individuals with different positions and responsibilities are summarized in chart form, except for question No. 2. Typical answers to the latter are quoted later. But here we should like to call your attention to a few highlights in the charts.

While most of those answering had

Revealed in Answers to Questions and Summarized in Charts


ENGINEERS
DID YOU EVER SEE OR HEAR THE TERM FOOD ENGINEER?
YES 3
NO 17
DOES YOUR JOB INVOLVE FOOD ENGINEERING?
YES 18
NO 2
DON'T KNOW 1
DO YOU CONSIDER YOURSELF A FOOD ENGINEER?
YES 11
NO 6
DON'T KNOW 3
WOULD YOU BE INTERESTED TO READ REGULARLY A MAGAZINE DESIGNED TO BE HELPFUL TO FOOD ENGINEERS?
YES 20
NO 0
THAT MAGAZINE MIGHT BE CALLED FOOD ENGINEERING. DO YOU THINK THAT IS A GOOD TITLE?
YES 18
NO 2
OTHERS
DID YOU EVER SEE OR HEAR THE TERM FOOD ENGINEER?
YES 6
NO 12
DOES YOUR JOB INVOLVE FOOD ENGINEERING?
YES 12
NO 6
DON'T KNOW 3
DO YOU CONSIDER YOURSELF A FOOD ENGINEER?
YES 6
NO 8
DON'T KNOW 4
WOULD YOU BE INTERESTED TO READ REGULARLY A MAGAZINE DESIGNED TO BE HELPFUL TO FOOD ENGINEERS?
YES 15
NO 3
THAT MAGAZINE MIGHT BE CALLED FOOD ENGINEERING. DO YOU THINK THAT IS A GOOD TITLE?
YES 17
NO 1
TOTALS
DID YOU EVER SEE OR HEAR THE TERM FOOD ENGINEER?
YES 56
NO 168
DOES YOUR JOB INVOLVE FOOD ENGINEERING?
YES 156
NO 24
DON'T KNOW 41
DO YOU CONSIDER YOURSELF A FOOD ENGINEER?
YES 101
NO 75
DON'T KNOW 44
MAGAZINE DESIGNED TO BE HELPFUL TO FOOD ENGINEERS?
YES 181
NO 32
THAT MAGAZINE MIGHT BE CALLED FOOD ENGINEERING. DO YOU THINK THAT IS A GOOD TITLE?
YES 148
NO 57

never heard the term "Food Engineer," a great majority said that their jobs involved Food Engineering. The first answer is to be expected, since an educational degree in Food Engineering has not been offered by colleges and universities in the past. Illinois Institute of Technology is the first to do this.

But regardless of their formal training, men in the industry well realize that the operation of a food processing business involves Food Engineering. It is particularly significant that most corporate officials and the majority of chemists, food technologists and research directors report that their jobs involve Food Engineering. Plant managers and engineers, of course, are up to their ears in Food Engineering. That they well know it is shown by charts at the top of these pages.

Functions of Food Engineer

Here are some typical answers to the question: "What are (or what would you assume to be) the functions of a Food Engineer?"

1. "The practicing of the art and science by which food, as it exists in nature, is converted into forms which are more adaptable to this day and age. This commercial conversion, however, should not destroy the properties of food but should, instead, improve flavors, nutritional content, palatability, etc.

"The Food Engineer should strive for product improvement always. He owes a sense of loyalty to the food industry and also to the public at large. Newer approaches to food processing should give the industry a much needed lift and give the public at large better foods and consequently better health."—Head of new products division of company producing banana flakes and syrup, and tomato paste.

2. "Supervisory duties pertaining to production and packaging of foodstuffs. Development of new technics that can be applied to production or packaging without altering the actual process through which the food must be put. The Food Engineer may be considered to be the individual who takes the process developed by food chemists on a laboratory scale and expands the volume processed so that the food reaches the consumer."—Chemist in bakery.

3. "Supervision of quality and economics of product manufacture. Quality control involves sanitation and maintenance of equipment. Also the Food Engineer constantly watches for new and improved methods for manufacturing. He probably is more interested in applying the results of research to practical uses than in research data as such. He is concerned with costs and products and methods."—President of beverage firm.

4. "Similar to a food technologist, with less pure science training but more engineering training and/or experience."—Secretary and vice-president of juice canning company.

5. "To process food in the most economical way consistent with quality."—Chemist in barley malt plant.

6. "Similar to those of a chemical engineer but specializing in the food line."—Director of control laboratory of margarine, mayonnaise and shortening company.

7. "To create new processes and to design new equipment for the improvement of the industry. To improve the processes and equipment now in use. To help control, improve and standardize all operations pertaining to the processing of foods and to develop their byproducts, etc."—Vice-president and consultant of firm canning fish, fruits and vegetables.

8. "A Food Engineer could be a chemical engineer working in the food industry exclusively."—Chief Chemist of baking powder and cocoa-malt firm.

9. "A food technologist with adequate industrial or mechanical engineering training or background to correlate and develop new processes, procedures and equipment."—Plant manager of dairy company.

10. "The application of a knowledge of chemistry, physics and engineering to the processing of food products. I see little difference between a food technologist and a Food Engineer. Perhaps the latter will emphasize more the machinery required to achieve the processing and results desired."—Chief chemist of candy plant.

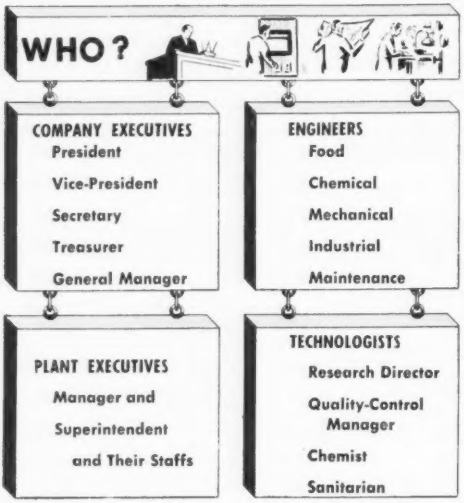
11. "A food production engineer as distinct from food technologist. Like 'steel production engineer' from 'metallurgist.'—Manager of quick freezing plant.

12. "To supervise, direct and control the manufacturing and processing of food products. To supervise, select, design and maintain the necessary plant, equipment, etc., for the processing, packing, handling and storage of food products. To direct, supervise and maintain a proper sanitary program."—Vice-president and production manager of milk, sugar and byproducts company.

13. "One who controls the quality and production cost of food processing through a combination of chemical, bacteriological and engineering technics."—Director of quality control for milk and milk products firm.

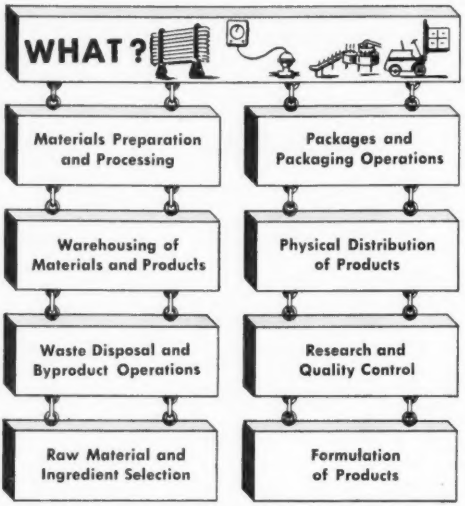
14. "Efficient production of high-quality food products from standpoint of equipment design and plant layout. Or it might mean designing food products to meet specific needs."—Chief chemist in dairy products plant.

Those FOOD ENGINEERING will serve



FE will be edited to help those who manage, develop or control food processing operations.

Functions FOOD ENGINEERING will cover



INFORMATION on all phases of advanced food plant operations will be presented in the pages of FE.

While they put it in various ways, these men in the industry seem largely to agree that Food Engineering is that branch of engineering that is concerned with the planning, design, construction and operation of food plants and processes. It appears safe to assume that they also agree that the broad basic sciences involved in Food Engineering are biology (including the important subdivision of bacteriology), chemistry (including in particular the factors that affect purity, nutrition and palatability, physics (as involved not only in the physical changes in the materials being processed but also in the design, construction and application of machinery), mathematics—and, yes, the ever-guiding science of economics. These conceptions the editors of FOOD ENGINEERING endorse.

We can summarize all of these elements in the following, more compact definition: Food Engineering is the application of food science in the efficient industrial production, packaging, storing and physical distribution of nutritious and convenient foods which are of uniform quality, palatable and safe. Controlled biological, chemical and physical changes usually are involved.

A Food Engineer may be said, for brevity at the sacrifice of comprehensiveness, to be a chemical or mechanical engineer specializing in food processing. In addition to engineering problems proper, Food Engineers are interested in raw-material selection and in product development, formulation and utilization.

FOOD ENGINEERING—The Magazine

A McGraw-Hill publication devoted to technical and managerial progress in the processing, manufacturing, packaging and physical distribution of food products.

It is intended to serve those individuals who hold responsibility for the equipping, operating and maintaining of food plants and for the controlling of quality, efficiency and costs in such plants.

It is edited for all branches of the food industry, including those that process or manufacture bakery products, milk and milk products, fruit and vegetable products, meat, poultry, fish, beverages, cereals and grain products, confectionery and all other foods.

Its editorial columns treat with all types of operations, processes and functions that already exist or should exist in food processing or food manufacturing plants, such as:

Materials Handling
Mixing and Blending
Separating and Classifying
Crushing, Grinding and Disintegrating
Forming and Coating
Washing and Sterilizing
Methods of Preservation
Quality Control and Sanitation
Instrumentation and Control
Heat Generation and Application
Formulation
Work Simplification
Plant Services
Refrigeration and Air Conditioning
Cooling and Freezing
Drying and Dehydrating
Concentrating
Thermal, Biological, Physical and Chemical Processes
Packaging
Mechanical and Electrical Power Transmission
Physical Distribution
Employee Relations
Standards and Regulations

What is the relation of the Food Engineer to the food technologist? The Institute of Food Technologists wisely considers engineering a proper function of its members, according to its constitution. Several colleges include some engineering subjects in their food technology courses. Therefore, many technologists are largely engineers, just as engineers, according to the definition arrived at earlier in this discussion, are of necessity also technologists. However, many food technologists have shown a preference for the scientific, research and quality-testing phases of food processing, rather than the engineering phases. In such cases, the Food Engineer can be said to be the man who puts the discoveries of the food technologist into commercial production.

The close relationship of engineering and technology has been effectively described by Bruno Pilorz, operating manager, California Packing Corp. We quote him in a panel below.

FE Serves Various Needs

Our concept of food engineering is that combination of technical knowledge and skills required to meet all of the requirements of a good food plant, as outlined so clearly by Mr. Pilorz.

And it is our purpose to publish information which meets those varied requirements. FOOD ENGINEERING is not a magazine concerned solely with mechanical operations in food plants. It also is concerned with the practical application of technology—from raw materials to the package in the consumer's kitchen. As in the past, much attention will be paid to ingredients and materials, product formulation, materials preparation and processing,

How Engineering and Technology Team Up in Good Food Plant Operation

Because of the clear, accurate picture which he paints of good food plant operation, we quote below comments made by Bruno Pilorz, Operating Manager, California Packing Corp.*

"A good food plant is a factory where foods of the best possible quality are produced at the lowest possible cost. The accomplishment of both of these ends is intimately linked with good engineering of the plant and with good technology, taking advantage of all the best developments in the food manufacturing field.

"To the strictly engineering mind, a food plant is an assembly plant where raw products, such as fruits and vegetables or fish or what have you, and other materials such as sugar, salt, spices, containers, labels, cases and so on, are combined into a finished product which makes available to the consumer throughout the year the production of farms, orchards and the sea.

"Being basically an assembly line, a food plant depends for efficient operation on a properly arranged and maintained flow of materials through it, with the various constituent parts meeting at the proper time and place.

"To provide for an efficient flow of materials is strictly the function of engineering. However, a food plant is not merely an assembly line and a materials-handling plant. The raw products as they are delivered to the plant are not in a shape where they can become a part of the finished product without first having things done to them, such as washing, blanching, cooking, pitting, peeling, sorting for quality, size grading, crushing, homogenizing and many other operations. And after this painstaking preparation, the problem of effecting complete sterilization has to be met.

"Food preserving has advanced from an art to a science. Over the years a very considerable body of scientific knowledge of performing those operations more efficiently, and of producing safer products of better quality, has been developed. An inevitable accompaniment of that growth of scientific knowledge was the development of the food technologist. Hand in hand with that technological development there occurred a steady advance in food plant engineering, and in the design of special equipment to meet the needs of the industry.

"Some plants have approached the ideal of moving materials and supplies through the plant in an uninterrupted flow from receiving platform or warehouse to the shipping platform, with all operations in balance and no bottlenecks along the line. A great many automatic and semiautomatic machines have been perfected, and engineering and technological requirements have called for the use and application of a multitude of automatic control devices."

In explaining where the food technologist fits into this scheme of things, Mr. Pilorz referred to a few functions which are fundamental, and which should have their influence on, or be incorporated in, the engineering design of equipment and layout:

"First is quality control. The consuming public has become more and more quality conscious, and large sectors of it will buy quality if they do not have to pay too high a premium for it. Many canners have set their own standards of quality. At the same time there has come into existence an ever-growing body of public regulatory standards.

"In a well-engineered food plant, the products are handled in such a manner that control over quality can be exercised easily, and so that corrective measures can be put into effect without disturbing production unduly. . .

"Plant sanitation has become a factor of quality control. A plant whose building and equipment are engineered with sanitation requirements in mind is kept clean much easier than a plant in which no attention has been paid to these details. It is at this point that close cooperation of the food technologist, not only with the plant engineer, but with the plant sanitarian, becomes a necessity.

"Then there is the problem of bacteriological control of sterilizing processes. . . A fairly recent sterilizing problem was posed by the appearance of flat sours in the packs of tomato juice. While the answers to such problems have been found by bacteriologists and technologists, there still are occasional cases of spoilage. Such cases generally are due to the wrong type of sterilizing equipment or to improper use of the right equipment.

"Processing equipment for any given product should be engineered with the technological requirements of the product in mind. The losses which otherwise are bound to occur may thus be avoided.

"Preservation of nutritional values in canned or processed food is another technological problem. National health demands that the consuming public be supplied with its full share of the nutritional elements preserved in the fresh products of farms and orchards. So nutritional information and knowledge should be used as the basis for engineering the layout and equipment needed for the product. . .

"The food packing industry will greatly benefit by incorporating in its plant engineering the technological knowledge which has been accumulated over the years and which will continue to be developed."

* From a panel discussion of advanced food plant engineering at the San Francisco meeting of the Institute of Food Technologists in 1949.

Outstanding Food Engineering Achievements

Samples of what engineering now is rapidly accomplishing in the food field:

■ **Baking**—Continuous mixing of cake batter, custard eclair filling and marshmallow cookie topping, resulting in better quality, faster and uninterrupted production, lower costs and less floor space.

"Automatic" bread baking plants with processes controlled by instruments and with dough and pans mechanically transferred from machines to conveyors and conveyors to machines.

Bulk handling of flour by pneumatic conveyors at great saving in labor, and also the use of portable metal bins to handle materials efficiently.

■ **Alcoholic Beverages**—Better quality control through advanced process instrumentation in breweries. Continuous wine fermentation to increase capacity and cut costs. Application of electrostatic air filters and germicidal lamps to avoid product contamination.

■ **Non-Alcoholic Beverages**—More uniform quality by premixing ingredients before filling. Great cost reduction by means of efficient materials handling. Electronic bottle inspection for quality control.

■ **Cereals and Grain Products**—"Pushbutton" flour mills and prepared-mix plants for higher efficiency and closer control. Continuous proportioning of ingredients to speed production, save labor and give uniform quality. Revolution in wet-milling technics through use of centrifuges, greatly improving efficiency. Adoption of bulk handling methods to save labor. Development of precooked and enriched rice processes for consumer convenience and better nutrition.

■ **Confectionery**—Redesign of equipment for improved sanitation. Extensive process instrumentation to improve quality, reduce labor costs and increase capacity. Application of continuous extrusion, and use of vacuum to change character of product. Multi-tier continuous coolers which save floor space. Simplification of box-packing operations to save labor.

■ **Dairy and Milk Products**—Continuous butter making process which increases efficiency and gives better quality control. High-temperature short-time milk pasteurization to reduce cooked flavor and increase capacity. Production of canned "fresh" milk, concentrated fresh milk and chocolate milk, and experimental work on frozen concentrated fresh milk. Continuous production of processed cheese in sheets that are automatically cut into ribbons, then squares, and packaged to provide convenient sliced product at low production cost. Introduction of ice cream in new form, individual-serving cubes, and high speed wrapping of ice cream slabs. Mechanization of stickless frozen confections for efficiency and sanitation.

■ **Fruits and Vegetables**—Continuous high-temperature short-time processing by the aseptic canning system to improve quality and speed production, and development of the agitating retort process for similar results. Development of the frozen concentrated juice process, with great improvement in evaporators and controls, and resulting in the most spectacularly successful new processed food in many years. Application of ion exchange to recover sweetener from waste pineapple juice.

■ **Meats**—Packaging of bacon and luncheon meats in flexible containers under vacuum to extend shelf-life and permit centralized production. Development of machine which injects curing solution into bacon slabs to tremendously reduce curing time. Introduction of solvent extraction process to recover fat from meat scraps, and use of centrifuges to make tank-water process highly efficient.

■ **Other Foods**—Highly engineered process for commercial production of pure monosodium glutamate to make it widely available as flavor enhancer. Development of a new sugar refining technic with quality and cost advantages.

This list is not all-inclusive, but it clearly shows the impact of advanced engineering on food processing.

packaging, quality control, sanitation, warehousing, physical distribution and worker productivity.

In short, our editorial columns will treat with all types of operations, processes and functions that exist—or should exist—in food processing and manufacturing plants.

The Engineering Trend

Why is there such a pronounced trend toward more and better engineering in the food processing industry? There are five reasons:

1. Quality standards are being tightened continually to meet competition and to conform with standards and regulations.
2. Sanitary requirements for plants and equipment are steadily becoming more stringent.
3. Costs have skyrocketed—for raw materials, supplies, labor, plant and equipment, shipping and taxes.
4. Profits are at a low level.
5. Demand calls for more capacity.

Engineering provides the only means through which a food processor can meet all quality, sanitary, cost and capacity factors and come out with even a slim profit to keep him in business. And during the emergency period of mobilization, good Food Engineering is required to cope with shortages of labor and supplies.

Engineering Era in Infancy

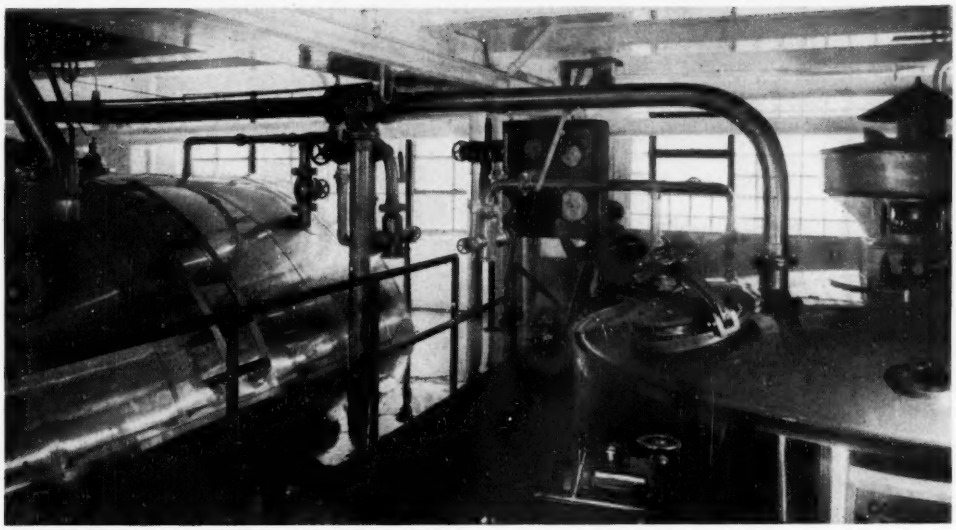
The trend to engineering in the food processing industry can best be appreciated by considering the accompanying list of recent engineering achievements.

Yet the Food Engineering era is only in its infancy. You can look for many more significant developments in the future. We are confident, for example, that engineers someday will develop the much needed continuous bread dough mixer. And we think they will find the answer to producing a frozen concentrated fresh milk with adequate shelf-life. It is likely, too, that blanching by dielectric heating will be made practicable, and that commercial application of cathode or x-ray sterilization will be engineered, as will ultrasonic sterilization and emulsification.

But more important than spectacular new processes, for the industry as a whole, will be the engineering of greater efficiency, quality control, and sanitation into existing plants, processes and packaging lines.

And this much is clear—it is the handwriting on the wall:

Any food processing firm which does not apply Food Engineering in large measure in the months and years ahead very likely will not be in business as an independent company ten years hence.



A NERVE CENTER at Sick's Seattle Brewing & Malting Co. is the mashing-schedule control panel, seen (rear) being checked by operator. It exemplifies the progress of instrumentation in modern brewing technics.

Instruments Take Hold in Brewing

Adroit use of engineered automatic control is boon to this ancient process. Brewers find two novel instrument developments are "naturals"

LLOYD E. SLATER
Assistant Editor, "Food Engineering"

You can credit two recent instrument technics with today's striking trend to automatic brewing.

For prior to these technics, brewery instrumentation was confined to simple quantitative measurement, since the unique dynamics of the brewing process defied most attempts to apply the automatic systems which have so advanced other industries.

But now, two basic instrument developments are rapidly closing the technical gap between an ancient brewing process and the latest in advanced food plant engineering:

■ **First, the program, or time-pattern, instrument combination.** This has enabled automatic regulation of a process variable over a predetermined and definite time schedule, thus providing the key to instrument supervision of exact procedures, as malting, mashing and fermentation.

■ **Second, electronic instrumentation.** This versatile new measuring tool has already solved the mystery of several hitherto elusive brewing problems, such as water pH control and coordinated process analysis.

Process Gains Result

With the practical application of these two newly developed instrument technics, brewers have attained closer control of the ingredients going into their beer. Particularly, they have standardized—

1. The pH of water through regulated acid addition.
2. Quality of malt through automatic kiln drying.
3. Uniformity of hops through controlled drying and storage.

Furthermore, automatic operation is now possible (where formerly detailed manual supervision had been the rule) namely in—

1. Robotized mashing procedure.
2. Unattended brewkettle boiling.
3. Balanced hot wort cooling.
4. Schedule-controlled fermenting.
5. Continuous beer blending.

Close-up of Technics

Before surveying the achievements of modern instrumentation in the brewery, let us take a closer look at the two basic technics sponsoring these gains.

Eloquent Sign

This special article describes how recent developments in instrument design and technic have now made automatic control a reality in the brewing industry.

Specifically, the use by brewers of an advanced processing technic—instrumentation—is one more eloquent sign of the new era of engineering efficiency in food production.

"Instruments Take Hold in Brewing" is the first of a number of informative reports dealing with instrument achievements and potentialities in the various branches of the food industry. Watch future issues of FE for the next special in this practical-engineering series.

Recorder-controller in lab . . .

1 LABORATORY at Minneapolis Brewing Co. provides convenient location for pH control panel. Switches permit selection of electrode in a specific water tank.

. . . tabs pH of water in tank and . . .

2 ELECTRODE, mounted through wall of water storage tank, transmits pH readings to the recorder-controller which, in turn, determines acid requirement of water.

During World War II, introduction of the vacuum tube in industrial-type instruments opened up a whole new field of process control. With this device, small electrical signals —generated as an index of a change in a variable—can be amplified until powerful enough to influence the movement of a servo-motor. Precise motor action, translated into conventional recording and control, can thus deal with measurements far beyond the range of mechanical type instrumentation.

An initial vital application of this technic is found in the automatic pH control of brewing water. Prior to vacuum tube instrumentation, pH was checked in the brewing lab by tedious colorimetric or electrometric means. Manual addition of corrective agent followed in plant-located water storage tanks.

A new glass electrode—similar to that used in lab determinations but more ruggedly constructed—is now applied directly to the main brewing water source. In addition, a capable electronic instrument today picks up the tiny electrode signal and allows continuous measurement and control. Resulting is a free-flowing supply of stabilized water —a basic ingredient of fine beer.

This simple maturing of a lab check measurement into a continuous-process control system is hailed as a major gain in brewing.

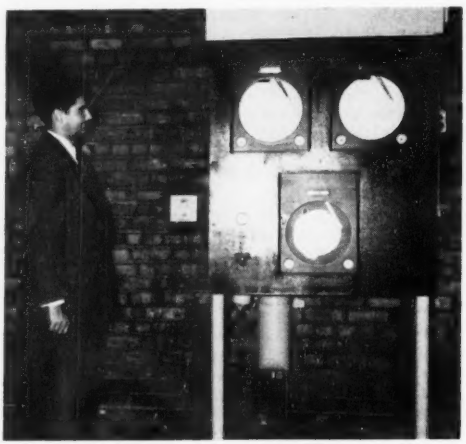
Easy to Apply

Brewers have found that the setting-up of water facilities for pH control is a relatively simple job. A number of operators continue to utilize the tank arrangements on hand, merely adding a pump which automatically delivers corrective agent until the tank water pH is stabilized, batch fashion.

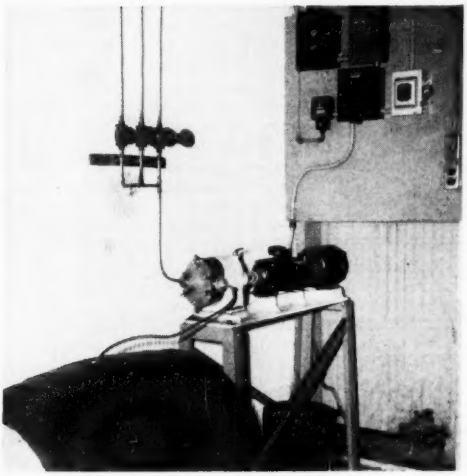
Others, particularly those whose breweries were built in recent years, have gone over to a pipe-line system of continuous water treatment. Here, the glass electrode is located directly in a by-pass in the water line from supply tank to brewhouse. Its associated pH control instrument

The "How" of Controlled Malting →

MALT-KILN panel at Theodore Hamm Brewing Co., St. Paul, has single-program cam scheduling the drying of two malt beds. Seen are recorder-controllers for each kiln, with transmitting unit underneath. Center photo: Controlled from panel (preceding picture) pneumatic motor (arrow) meters fuel to burner supplying hot air to malt kiln. Flame-failure devices—for either oil or gas—are safeguards. Far right: This malt mash bath, used as laboratory malt analyzer, follows exact cam schedule of program-control instrument.



. . . dispatches corrective agent



3 **LACTIC ACID** is pumped, at demand of controller, from barrel to selected water tank. Note manifold with separate pipes leading to each of three water-storage tanks.

regulates a diaphragm valve situated in the additive supply line, well before the point of measurement.

Time and Temperature Balanced

Instrumentation's other special offering—the program control system—meets a primary challenge of the brewing process. This involves maintaining the correct relationship between process time and temperature. Proper balance between these two factors keynotes successful operation right through the brewhouse, from the cereal cooker and mash tub into the brewkettle and, finally, to the fermenters. In addition, such a balance must also be rigidly preserved in the pasteurizer.

Program control, as its title implies, involves the regulation of process variables—temperature, pressure, flow, etc.—in accordance with a definite sequence or time schedule. This has been very simply provided in instrument form by teaming up a cam-containing transmitting unit with the conventional controller. The metal cam has the same graduations as the controller chart, and is cut to a fixed schedule. Mechanical or air transmission, reflecting the position of a riding arm on the contour of the clock-rotated cam, automatically adjusts the control point of the system in keeping with its program.

Before detailing the many places for program control in the brewhouse, we might look at an outstanding example of this instrument technic being used in the production of an important beer ingredient.

Very few brewers do their own malt kilning these days, but it is of interest to know that the same control system used on their cereal cookers also is at work producing a dependably uniform malt for their brew. In this case, however, the product is hot-air dried rather than cooked, and control not only involves automatic burner manipulation, but also movement of dampers and louvers on the kiln structure, if necessary.

A malt kilning program will vary considerably with the type and quality of end-product desired, and various cams can be cut for different schedules, these being interchangeable in the instrument. Brewers with their own malt kilns can thus develop an instrument cam which "fixes" their malt type—one safeguard against undesirable variations in beer character.

Some commercial malting houses have also developed individual cams to suit the specific requirements of many of their customers as an attractive special service.

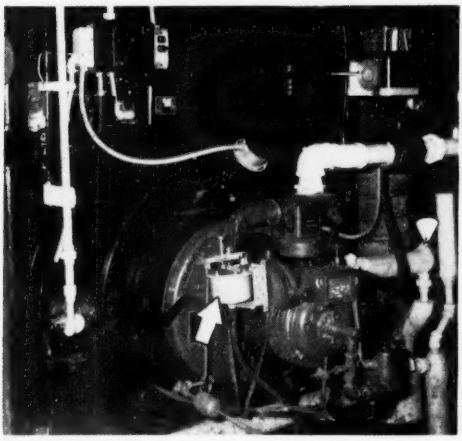
Program controls are also used to analyze as well as to help form the quality of malt. Most breweries analytically determine the extracting quality of the malt they use. This check is executed in a pilot mashing cycle set up by the American Society of Brewing Chemists. It is significant to note that the newest laboratory malt mash bath is supplied completely equipped with an integrated program control instrument system.

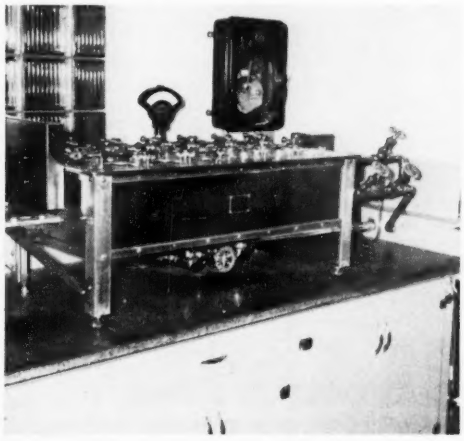
Brewhouse Instrumentation

Program control possibilities have, to date, captured the brewer's imagination mainly at the cereal cooker and the mash tub. Both of these operations involve distinctive schedules which have been set up through long years of experience by the brewmaster. Because of this, carrying out a mashing procedure has always required strict supervision.

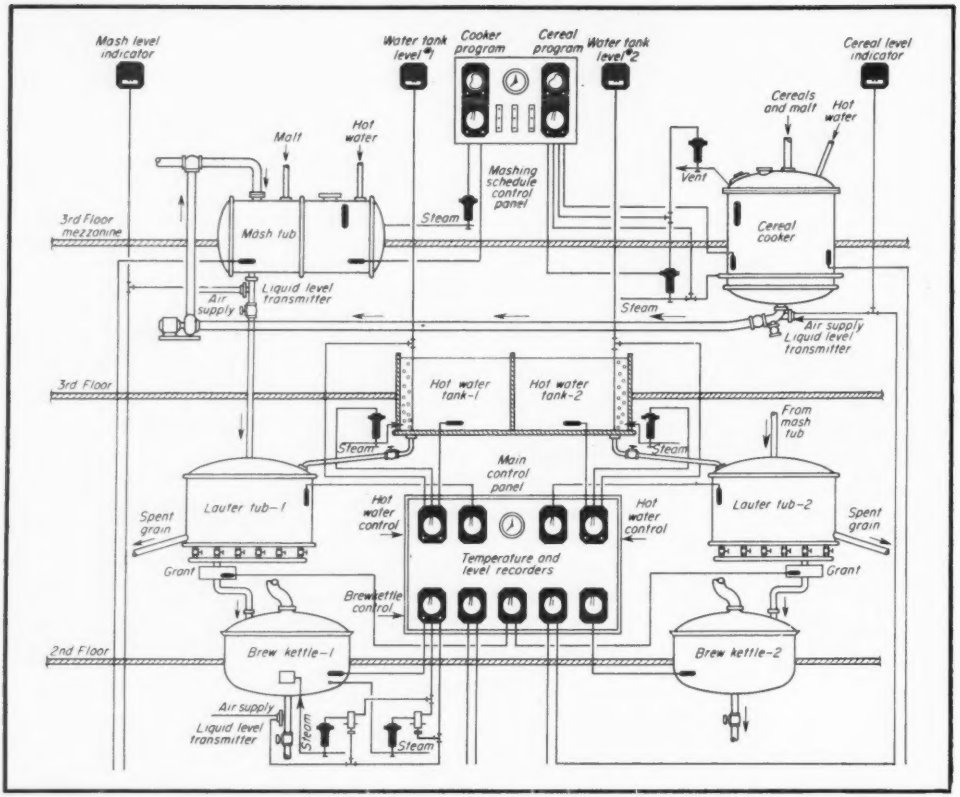
Small wonder that the brewer has started to seize on this new, practical means to enforce his vital mashing schedule.

At the cereal cooker, program control systems have been developed for carrying out cooking schedules in the open





Schematic Shows Hookups With Various Brewing Units



BREWHOUSE instrumentation at Sick's. Upper control panel regulates mashing schedule, while lower main-control panel provides a central check on all the brewhouse operations. Included in the latter data are temperature and level of liquid in cereal cooker, mash tub, water tanks, lauter tubs, and brew kettles.

vessel, or closed, retort type unit. These simply involve the basic time-temperature controller, with sensitive bulb directly in the cereal, regulating steam admission through a diaphragm control valve to maintain temperature as per its cam-cut schedule. As in malt kilning, interchangeable cams will allow control in keeping with the type and kind of adjuncts being used.

The mashing schedule that a brewer follows is complex and highly critical in its values. In meeting this challenge, successful use of program control on the mash tub has probably done more to dramatize instrumentation in brewing than any other unit operation.

Mashing requires conversion temperatures to within a fraction of a degree Reaumur, timing to within seconds. Automatic controls are inherently designed to meet such tolerances. Brewers who have instrumentized their mash tubs report a considerable improvement in the uniformity of wort, plus more satisfactory results at the brewkettle.

Actual elements of a control system for the mash tub are similar to those used on the cereal cooker. However, the critical nature of conversion requires as narrow a temperature span in the instrument as possible. The accuracy of control received relates directly to the amount instrument pen moves per degree of temp. change.

Therefore, a special span of 30-70 deg. R. has been found useful for mashing, and at least one brewer has found it advisable to utilize an electronic type controller at this point because of its inherent precision.

Brewkettle a Challenge

Complete brewkettle instrumentation is still in the hypothetical stage. Time and temperature in the operation are concrete variables that can be effectively dealt with. Similarly, a level measurement of wort in the kettle is feasible and will allow control of steam to individual heating coils, if used.

However, no instrument has as yet been developed that will continuously estimate protein coagulation during boiling. Further, hop extraction is another variable which would be difficult to gage with any of today's equipment. At the moment it is safe to say that experience and human judgment still comprise the master control at the brewkettle.

But certain instrument technics have been applied to "tame" some brewkettle variables and aid in supervision of this vital operation. For example, a program control system, similar to that on the mash tub, has been used with success. At the brewkettle, however, the relationship between time and temperature is rather simple, since boiling usually occurs at a fixed degree for a definite time period. A less complex instrument version of the program system can thus be used, consisting of a single controller with built-in electric timing device.

This simple program control of brewkettle boiling is claimed to establish an optimum evaporating rate—vital to a good "break" in the kettle.

Another successful kettle technic involves the use of a level control. When the kettle is being filled, this controller will only allow admission of steam to those coils which are covered by wort. This is accomplished by a series of control valves on the kettle steam manifold, each valve being actuated by the level controller as the wort rises or falls. Further, as the wort condenses, this control action will have the effect of hindering violent boiling or superheating, which might occur should live steam coils be exposed above the surface of the liquor.

Automatic pressure control suggests another means for stabilizing the kettle during boiling. A desirable "rolling" action depends, to a good extent, upon the absence of vacuum in the vapor space above the wort. Conversely, over pressure boiling, with subsequent abnormal temperatures, occurs when pressure in the vapor space is above atmospheric. An absolute pressure controller, tapped into the kettle head space above the wort, could continuously adjust an exhaust damper to maintain atmospheric pressure at all times.

A "plus" virtue of the absolute pressure controller is its ability to control at a fixed value from day to day, despite dips and jumps in atmospheric pressure due to the prevailing weather.

Certain other recent advances in the art of continuous measurement might, some day, conceivably find inclusion in this suggested complex of brewkettle instrumentation. Continuous density measurement of fluid food products is now possible, with instrument accuracies of better than plus or minus 1/10 deg. Balling. New "in-stream" devices for measuring the optical density and even color of liquors are also available and may prove a workable tool in the brewery.

Fermentation Control

Another vital place for program control is found in the fermenting room, particularly where attemperating coils are used to regulate the fermenting cycle.

Wort, from the starting tank, generates considerable heat during initial stages of fermentation. Maximum flow of coolant through the attemperating coils is usually necessary at this time. However, as fermentation progresses and beer is formed, less heat is evolved from the fluid and controlled cooling is in order.

A detailed fermentation schedule demands frequent temperature checking and valve adjustment in the coolant lines. And these check-ups multiply, since several dozen fermenting tanks are usual in most breweries, making supervision of the fermenting process an arduous 'round-the-clock responsibility.

Once again, program control equipment is a "natural". Here, the temperature bulb is of the sanitary type, projecting through the wall of the fermenting tank directly into the beer. The controller cam is shaped to simulate the desired fermenting cycle, and coolant flow to the tank is regulated in accordance with beer temperature and this cam-cut program.

And so, today one may tour the vast fermenting cellars of some of our larger American breweries and find them completely unattended—the only visible evidence of a dynamic process being the hiss and thrust of pneumatic valves as they meter coolant to the tanks.

Now let us go back to our other instrument technic—electronic measurement—and explore a few more of its proven benefits:

Unique control requirements are offered by the hot wort cooler—one of the few continuous operations in the brewing process. Both Baudelot (open) and closed type coolers

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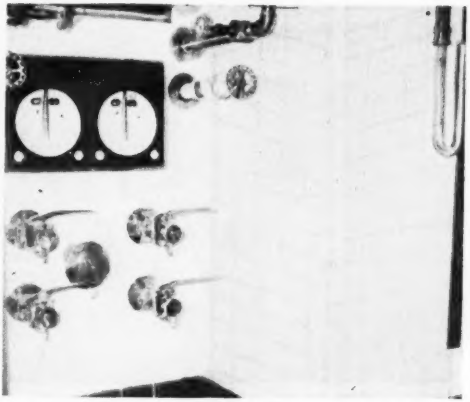
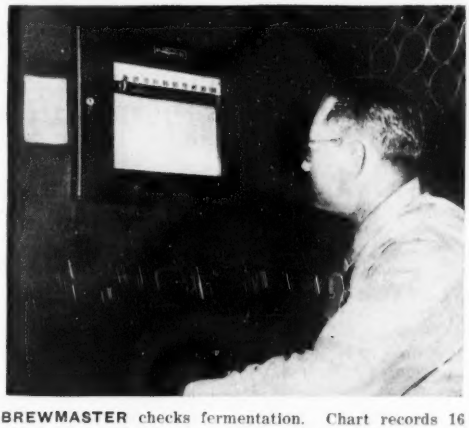
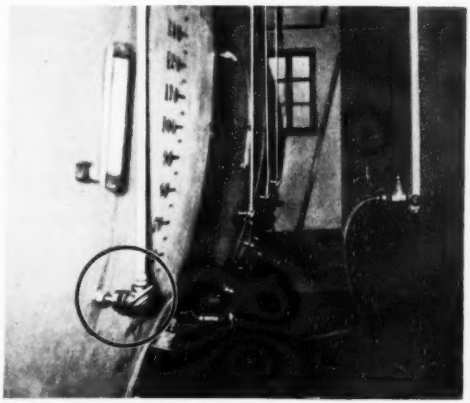
Fermentation Applications



IN TILE-ENCLOSED tanks, fermentation may be either slowed or speeded by these instruments. (Hamm plant)



BREWMASTER checks fermentation. Chart records 16 widely scattered process temperatures. (Blitz-Weinhard)



HERE on fermenter, bulb directly measures beer temperature during cycle. Recording is at panel (preceding photo)

Old Gives Way to ⟶

TRADITIONAL BATCH METHOD of making butter required numerous churns and aging tanks and, consequently, large areas of valuable floor space. Much labor was also needed because of hand operations involved.

Switch to *Continuous*

It has brought processor six top benefits

By "ditching the batch," Iowa butter maker ups output, saves labor and floor space, gets more uniform product. Steam and refrigeration conserved, too

FE STAFF

An increase in production, decreases in man-hours and in floor space used, and higher, more uniform quality are the measurable benefits obtained by Frank Pilley & Sons, Inc., of Sioux City, Iowa, by converting its butter-making from a batch to a continuous operation.

The rise in production—fully 12.8 percent—permits an expansion in markets supplied, without the building or buying of another plant. Moreover, conversion to the continuous method gives potential for even greater output, without an increase in equipment, in event an additional supply of cream becomes available for butter making.

The decrease in man-hours—70 percent—means not only a saving in labor cost, but also a gain in experienced and trained personnel available for use in other divisions of the company's business. This is advantageous to both company and individuals, through higher productivity, promotions, and better wages.

The decrease in floor space has also been 70 percent. This has made possible a doubling of the liquid milk bottling operations and the installation of a thoroughly up-to-date ice cream plant in the floor areas formerly required to make butter.

Attainment and maintenance of high quality result from improved standardization of the cream as to fat, flavor, salt, and water content, and the uniform procedure used to convert this cream into butter.

Process Pin-Pointed

The over-all butter-making operation consists of:

1. Cream receiving and grading,
2. Conditioning by cooling and filtering,
3. Concentrating by centrifuging,
4. Pasteurizing and cooling under vacuum,
5. Standardizing fat, pH, flavor, moisture, salt, and color,
6. Chilling,
7. Working or Texturating, and
8. Packing for storage or molding into market units.

Cream containing 30 percent fat in 40-qt. cans is trucked from the several railroads entering Sioux City and from surrounding dairy farms. At time of receipt, it is inspected and graded for taste and odor, sampled, weighed, and emptied immediately into a stainless steel receiving vat. From 700 to 1,000 cans are received daily.

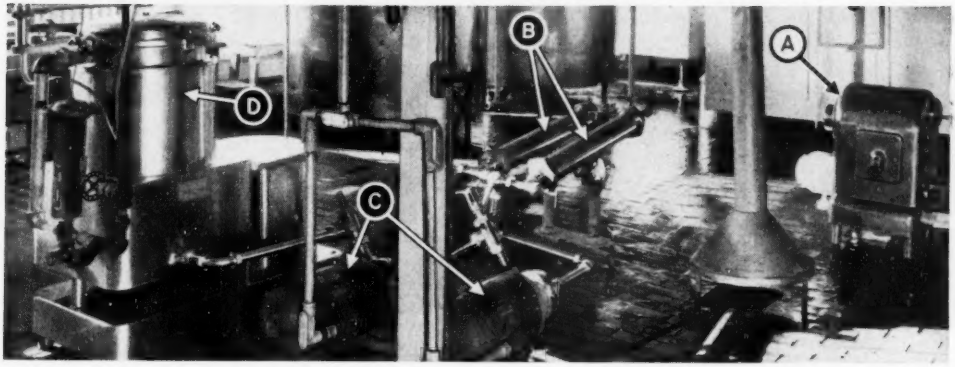
All the new equipment used was supplied by Cherry-Burrell Corp., of Chicago. The centrifugal, constant-flow, sanitary pumps deliver the cream to 1,000-gal. vats, equipped with rotating coils, where its temperature is adjusted to about 60 deg. F. These vats are operated in pairs, one being filled while the other is being emptied. Also, each grade of cream is held separately.

From these vats, a metering pump forces the tempered cream through an all-stainless steel pressure filter to remove coarse suspended solids.

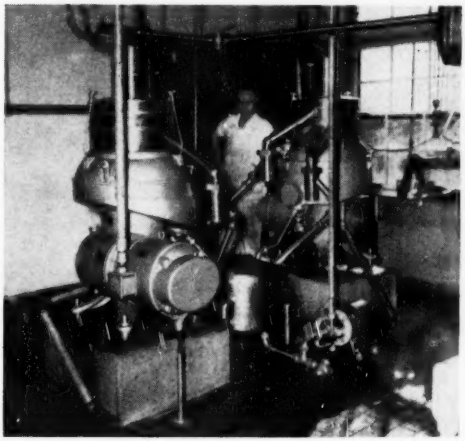
After filtering, the cream is forced through a high velocity centrifugal destabilizing unit, driven by a 7½-hp. motor, to break up the agglomerates of fat and casein preparatory to delivery to a centrifugal heater, where its temperature is raised to 130 F. The latter unit is similar in design and operation to a continuous pasteurizer. Movement of the cream is from the feed inlet (at the bottom) upward, by the driving action of a stainless steel agitator. Curved blades in the top of

(*Turn to page* 177)

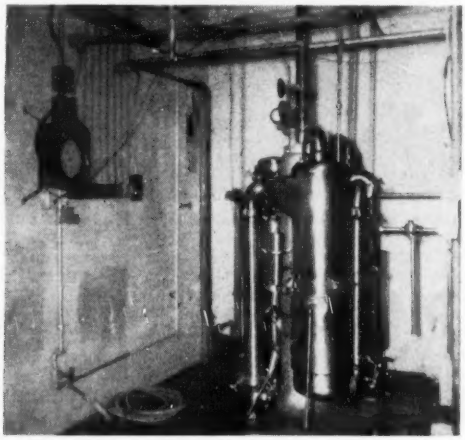
New, More Efficient Production



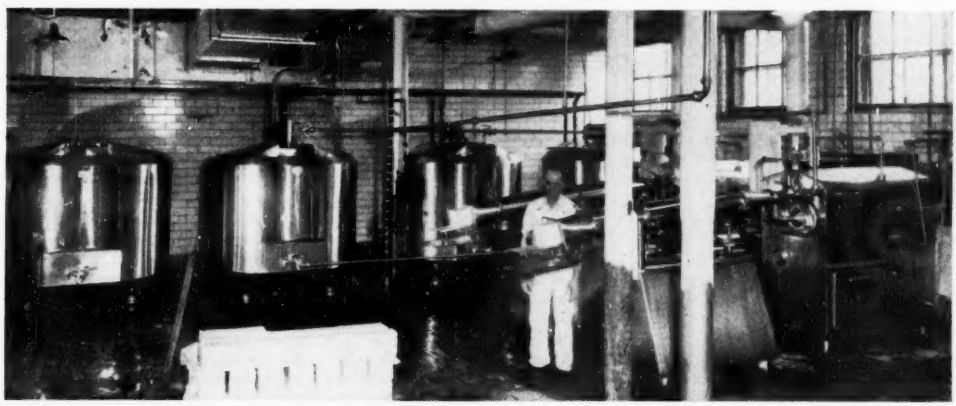
IN CONTINUOUS PROCESS, metering pump (a) forces cream through pressure filters (b) to high-velocity destabilizing unit (c) that feeds centrifugal heater (d). Here, temperature is raised to 130 F.



SPECIAL SEPARATORS receive cream from heater and deliver concentrate of 88-90 percent fat.



VACREATOR heats fat concentrate to 200 deg. F., then cools it to 110 under vacuum to remove off-flavors.



FINAL STEPS are standardizing, chilling and working. Operator observes butter extruded from Texturators. Unit (right) is chiller. In tanks (rear) fat, moisture, pH and flavor are standardized. Salt and color are added here, too.

CAPACITY of warehouse was quickly doubled when palletizing enabled an increase in stacking height.

PALLETIZING: Saves All-Around

For Capital bottler, it ends double handling, cuts loading to a jiffy, augments vital storage, slashes breakage losses—all big labor-time-cash economies

BERNARD SCHWARTZMAN
Vice-President, Pepsi-Cola Bottling Co. of Washington, Washington, D. C.

Pepsi-Cola Bottling Co., of Washington, D. C., has reduced labor costs by approximately $60,000 per year and cut delivery truck requirements by 23 percent. And, it has increased storage capacity of its plant and warehouse by about 75 percent.

Putting in a fork-lift pallet system did it.

Still other economies resulting from the changeover are: Elimination of bottle breakage during handling of cases of empties and fulls; a cutting down, accordingly, in losses of merchandise due to breakage of full bottles; and lessened damage to cases from rough handling.

The new system was installed as a result of an intensive survey made to find ways of slashing operating costs to offset increases in the price of every ingredient used in the company's beverage. The study indicated that a reduction in labor offered the greatest opportunity for cost-cutting.

And, since truck labor (unloading and loading) consumes the greatest proportion of total labor, methods of reducing it were immediately investigated. Palletizing seemed to offer the best solution to the problem, so plans were made to convert.

By trial and error, a better truck body was designed. Then the plant proper was considered and correlated with the new pallet system.

Now let us see how the benefits were obtained:

1. Reduction In Labor. With the former manual operation, the five truck stations—two for unloading, three for loading—required 20 men to handle cases and 2 checkers. In addition, a second crew was needed during the summer months.

Based on 80c-an-hour labor, with 10 hr. overtime, cost of the regular crew approximated $35,000 yearly. Checkers received in the neighborhood of $3,500 each. Adding to these figures the amount paid to the summer crew gave a total of about $60,000 for the entire year.

Now, manual loading and unloading of trucks has been eliminated. Only the two checkers remain, and they have been made fork-truck operators as well as checkers.

Since pay covering the two men totals approximately $7,000 per year, the saving in this operation alone will amount to about $53,000. Hidden saving is the almost complete independence from labor.

2. More Work Per Truck. The con-

stant desire of all business is to increase its sales. To do this, more trucks are needed for delivery. But before long, plant space runs out, and no more trucks can be handled with the operation in effect.

In our case, the manual method of loading and unloading had governed this operation. With 35 route trucks, it is not unusual for as many as 15 to return to the plant at almost the same time for reloads. Since it takes approximately 20 min. to unload and load a truck manually, it follows that the last truck in line would have to wait about 3 hr.

To serve routes properly under these conditions, more trucks were needed than the territory actually warranted. The inevitable happened: We got more business than the plant could handle without disproportionately increasing labor costs.

With the installation of the pallet-bodied truck and the pallet system, time for unloading and loading was reduced to 5 min. Drivers, no longer delayed in reloading, completed their routes early in the afternoon. A consolidation of routes followed, and when this re-routing was accomplished, these effects were noted: Only 27 trucks were now needed, service was more frequent; and additional business could be handled.

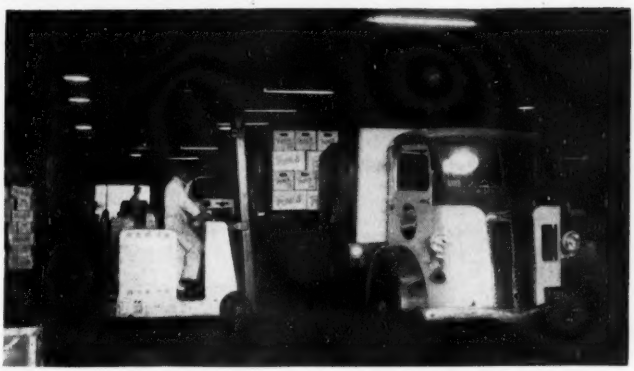
3. Storage Space Upped. With manual stacking in plant and warehouse, the comfortable height was 8 cases. And so, with a 14 ft. ceiling in the plant and an 18 ft. ceiling in the warehouse, there was considerable lost storage space. Answer was the pallet system—increasing storage space in the plant 50 percent and in the warehouse 100 percent.

To be more specific, stacking height in the plant was increased from 8 cases to 12, and in the warehouse from 8 to 16. This one feature in itself eliminated the necessity for an additional building.

4. No More Unnecessary Handling of Materials. In considering movement of materials, each handling had to be counted. This tabulation included unloading and loading, stacking empties, loading fulls, feeding conveyor for the machines, and stacking full goods. The pallet system reduced the former 11 handlings to just 2—placing of empty cases on the conveyor for filling, and removal of full cases for placement on pallets. Realizing that each handling costs ¼c., the new system made a very big cut in the yearly operational cost.

Manual handling of freight went out when pallets were placed at the tail gate of an incoming truck. The entire load is now removed by the truck driver. This change did away with need for a freight crew.

Loading Time Down



"WITH INSTALLATION of pallet-bodied trucks and the pallet system, total time of unloading and loading was reduced from 20 to 5 min."

Another major factor, whenever beverages are considered, is the aforementioned breakage of bottles and loss of service of cases. Hand operations result in a tremendous loss of bottles, and subject cases to great abuse. When the pallet method was installed, this loss, which was not considered in the original estimate of savings, was nullified.

Along with our manual handling of cases, a conveyor system containing power belts, bends and crossovers, was required. It follows that space otherwise useful for storage, was needed for the plant operation. Also to be considered was the conveyor maintenance. Then, the conveyor system is rigid. It necessitates the stacking of case goods where the conveyors are located, and only by using portable units can this system be altered.

For every foot of conveyor, 3 ft. of floor space is required. And this same area, 3 ft. wide, will hold a pallet. Since pallets can be stacked, as many as two or three can be placed in the space formally taken up by the case conveyor. This in itself adds a tremendous amount of usable storage space that was otherwise unavailable.

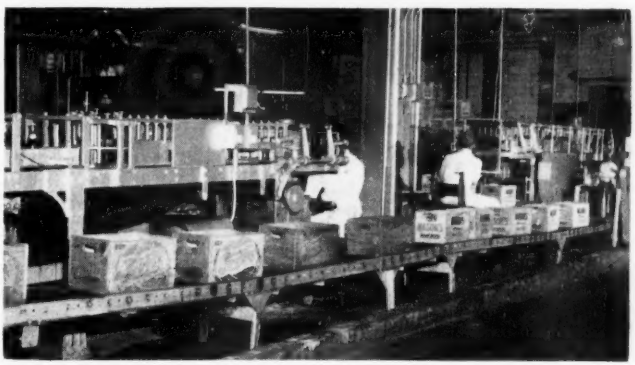
When the pallet system was installed, most of the full-case conveyors were removed, and their maintenance, therefore, was eliminated. More storage space was added and warehouse manpower was done away with—only the fork truck operators, were needed.

The next important step was to coordinate and revamp machinery to dovetail with the pallet system. By redesigning both the bottle and case conveyors, adding two automatic case packers, and relocating the empty and full cases in the warehouse, the revision was easily accomplished.

An example of the simplicity of the change was the placing of both automatic case packers in a line and

(*Turn to page* 210)

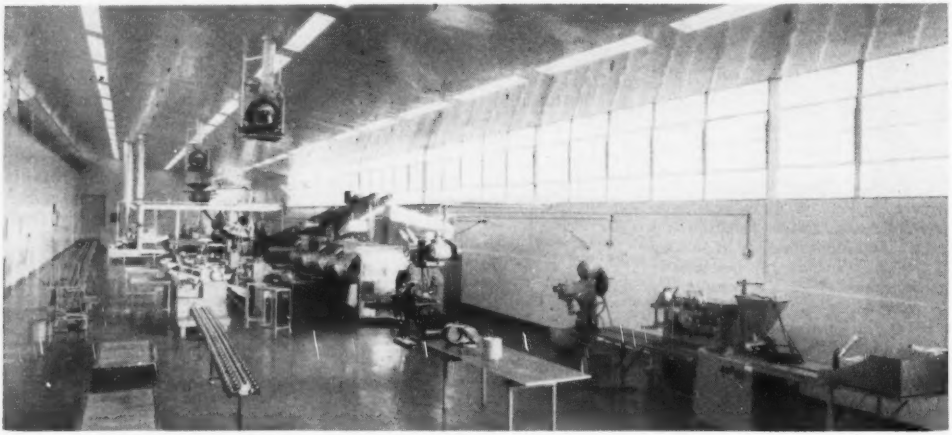
Operations Simplified



AUTOMATIC CASE PACKERS were lined up like this so that full cases could travel on one common conveyor leading to the storage area.

Modern Design—Both Outside and Inside

NEW PLANT is one-story, saw-tooth, mill-type structure. Skylights provide ample natural light, excellent ventilation. Rail facilities (rear) bring grain right to elevator. Yard and dock areas (side) permit fast and easy movement of trucks.



SMOOTH, straight, unobstructed walls, ceiling, and floor mark interior construction. Fluorescent fixtures are recessed for safety, against breakage, and ease in cleaning. Machines are spaced to promote maximum safety, plant sanitation.

"From Scratch—to $15,000,000"

In four words, that's Frito's striking story. And here's the motivation behind it: Constant planning, researching, refining, with advanced engineering the practical denominator—as exemplified in this new, functional L.A. plant

BILL CROW, JR.
Production Manager, The Frito Company, Western Division, Los Angeles

Starting in 1932 from "scratch," Fritos annual sales volume has now grown into figures surpassing $15,000,000. And food plant engineering played a large part in this success.

Processing of this popular corn product began with the adaption of a housewife's potato ricer, equipped with slots instead of perforations, and used to extrude the corn-dough ribbons. From this primitive beginning, the Frito Co., Dallas, Tex., constantly progressed. And now there has come its most recent development—the

newly constructed $500,000 Los Angeles plant (see lead pictures) which headquarters the company's Western Division.

In three years time, the processing flow-line has been refined, new machines and equipment developed specifically for this process, and these now combined in the new building designed especially to house them.*

The company is convinced that the advances in production efficiency of the plants can be attributed to the management's recognition of these two maxims:

- **Machines and processes never reach the ultimate in perfection—improvements are inevitable.**
- **Better technics and product quality are developed and refined through continual technological research.**

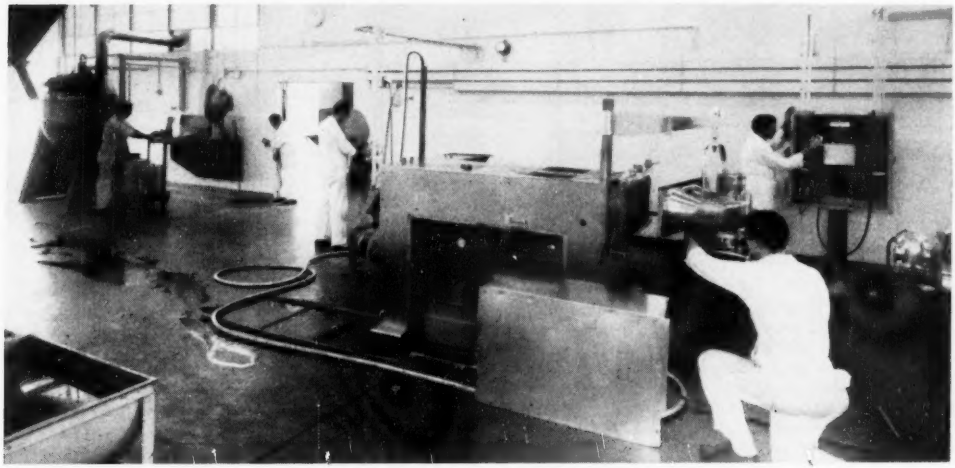
This basic engineering approach has been evidenced in the efficient design and construction of the Los Angeles plant. Its saw-toothed roof construction provides ample natural light. Fluorescent ceiling fixtures are recessed for safety against breakage and ease in cleaning. Machinery installations have been spaced on the concrete floor with particular forethought in order to provide a high degree of

* For further perspective over the period named, see earlier special article, p. 71 Aug. '48 FE.

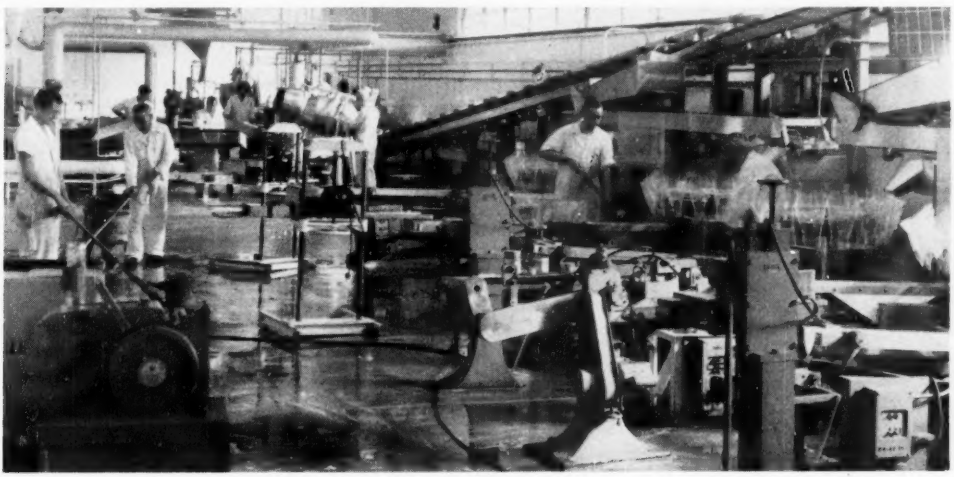
Graphic Overall View

—of the skillfully engineered Fritos and Cheetos production lines will be found in this month's special FE Picture-Flowsheet. Diagrammed over the four foldout pages is the full operation, from "in" to "out," along with clear closeup photos that "spot" major points. Turn to p. 154-157.

"Sanitation Is Rule, Not Exception"

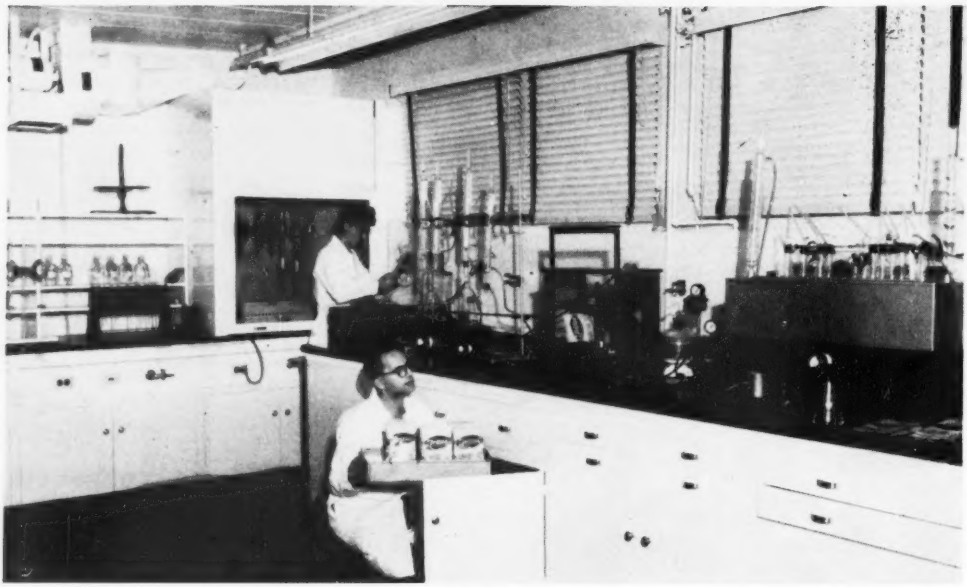


EQUIPMENT is designed for ready dismantling, thorough scouring. Hydraulic press (center) has been pushed from cooker, and operator is removing extrusion head. All machines in plant (see units, rear) get same exacting treatment.



THE BIG CLEAN-UP includes not only all machines, but also floors and walls. In latter operations, areas are washed with a mild caustic soda, scrubbed with a detergent, and cleaned with a high pressure steam gun. Operating crews handle job.

Laboratory Keeps Quality High



HERE in the laboratory, representative samples from each carload of corn arriving at plant are made into a control batch of Fritos to determine cooking and grinding characteristics. Thus, commercial product quality is laboratory set.

safety, working comfort, sanitation.

While there were some conventional types of equipment that could be adapted to this process, the majority of the units had to be designed for it. Most outstanding among these are the extrusion-press and automatic cooker, the conveying equipment, and the automatic weighing and bagging machines.

Product and Process

Fritos (meaning "fried things" in Spanish) are the original corn chips, made of selected yellow and white corn. Corn is received at the plant in bulk form from rail cars and placed in either one of two grain elevators. After a careful cleaning process it is conveyed to the "daily-use" hoppers, from which it flows by gravity to the weighing hopper.

Batches of 450 lb. are weighed and automatically dumped into the steam-jacketed cooking vat.

A mild solution of water and lime is added and the batch is cooked at 212 deg. F. Time of cooking varies with the source of the corn. However, upon the arrival of each carload of corn, the laboratory selects a representative sample and processes a control batch of Fritos to determine cooking and grinding characteristics. This data is used by the plant superintendent in setting-up his processing instructions.

The pre-cooked corn and steep-water is then dropped into soaking vats, where it remains for several hours, depending upon the characteristics of the corn. Soaking softens the grain for the grinding operation and also permits water penetration. The amount of water penetration determines the quantity of oil that will be absorbed during cooking.

The oil content of the product is carefully guarded. It is a foremost element upon which the flavor of the finished product depends.

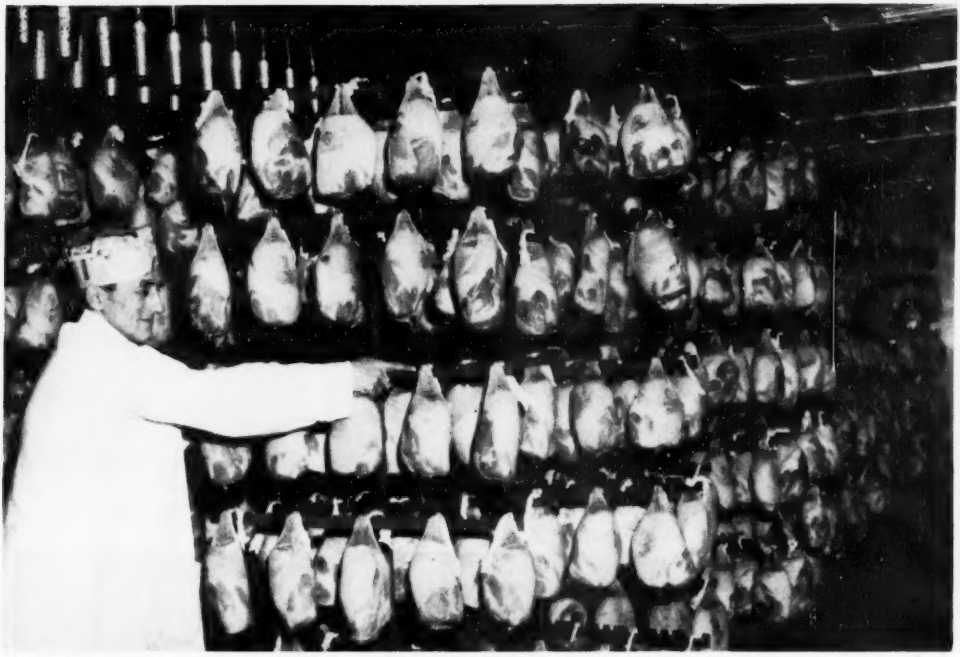
The corn is now transferred from the soaking-vats into the stainless-steel washer. An augur moves the corn through a perforated stainless steel cylinder, and high pressure sprays remove the steep-water, loose hulls, and any extraneous material. From the washer drain-tank, the corn is fed into the grinder.

Here, the corn drops between two rotating lava-stones and is ground into a corn dough similar to that used by the Indians long ago. This method of grinding preserves the flavor, eliminates scorching, and produces a product of the required granular size.

This corn dough, given the Spanish

(*Turn to page* 202)

CLEAN, TIDY equipment and surroundings help make happier, more productive workers—paying off in higher output.



IN THIS new multi-purpose, stainless-steel smokehouse, items like these pork shoulders are smoked, then washed.

How Boston Plant Built '51 Efficiency:

ENGINEERING DID IT

Making 9 changes accenting advanced equipment and technics, meat packer saves labor, avoids delays, improves quality, simplifies sanitation, and enhances appearance of plant. New machine skins frankfurters

JOHN V. ZIEMBA
Assistant Editor, "Food Engineering"

Advances in meat-packing practices have brought about marked increases in productivity at the plant of Boston Sausage & Provision Co., Boston. And these changes have also enabled this enterprising packing firm to improve the quality of its products and to make its up-to-date plant one of the showplaces of the industry.

In its streamlining of the packing operations to 1951 efficiency, the management engineered nine distinct improvements:

1. Speed-up has been attained in the sausage kitchen through the use of a bucket-monorail system of weighing and feeding meats into the cutting and mixing machine.

2. A dual-stuffer enables paired workers to fill casings with sausage meat continuously.

3. By baking meat loaves in a stainless-steel reel oven having automatic temperature controls, considerable time and labor are saved.

4. Newly installed smokehouses do a triple job—smoke and wash meats as well as steam-cook frankfurters.

5. The task of keeping the sausage-packaging room clean has been simplied—for all surfaces are now covered with heavy-gage, highly polished aluminum sheets.

6. A high-speed, automatic frankfurter-skinning machine has been installed to do away with the tedious job of removing casings by hand.

7. Unbreakable, easy-to-clean plastic trays have replaced metal ones for weighing franks on the 1-lb. line.

8. Vats of frozen meats are now easily defrosted by running tap water through permanent overhead pipes instead of the old rubber hoses.

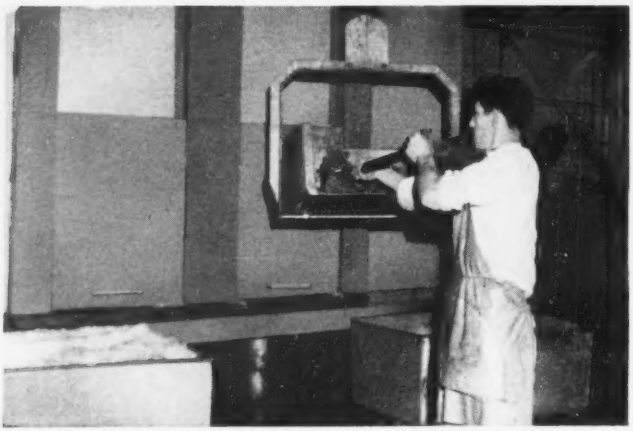
9. A brine-filtering system is used to assure purity of the pickling solution.

Let us describe each of these advances in detail, following the order in which they were just named:

1—Improved Meat Handling

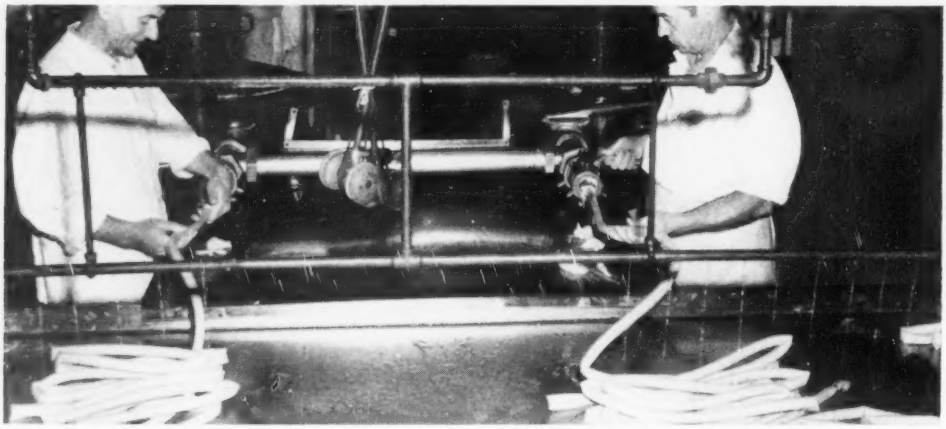
The new efficiency in the sausage kitchen has been attained through a speedy method of handling the meats

These Changes Simplified Sausage Handling and Stuffing



EASIER HANDLING. Meat goes into bucket carrier suspended from trolleys riding monorail. Next, bucketload of meat is 'railed to . . .

MIXER in which meat is carefully blended with other ingredients.



QUICKER STUFFING. By connecting two stuffers and employing one man to keep them filled with meat, two workers now continuously fill casings with sausage meat. This dual stuffing system stepped up production about one-quarter.

—weighing, hauling, and then dumping them into a cutting-mixing machine. Employed is a bucket-monorail, using a technic that eliminates the triple transfer of meats formerly required between push-trucks, scale, and the cutter-mixer.

The new handling system employs four 200-lb.-capacity stainless-steel buckets, or "flyers", open at one end to facilitate loading and unloading. Each bucket, pivoted to a metal frame suspended from trolley, rides on an overhead circular monorail running between the weighing and mixing stations. The closed end of each bucket clamps to a horizontal section of the frame so that there is no danger of tipping during loading or when pushing the meat to the cutter-mixer.

Meat is shoveled into each bucket at the weighing station, where there is a scale built into the overhead track. After the required amount of meat is weighed, the bucket is trolleyed to the cutter-mixer. At this point, a worker releases the clamp so that the bucket swings freely on its pivot. Then, guiding the bucket, he dumps the meat into the cutter-mixer.

Spices and other ingredients are added, and as the mixture is blended, the meat is also cut and chopped. Finally, the sausage meat is ready for stuffing into casings.

2—Faster Sausage Stuffing

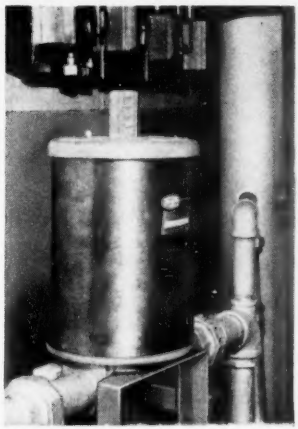
Second ingenious technic, paying off well in the sausage kitchen, is the dual-stuffing system, which has increased productivity about one-quarter. By connecting two stuffers with a 2-in.-dia., H-shaped, stainless-steel pipe system, and using one man to keep these machines filled, two operators can now stuff sausage meat into casings without interruption.

Formerly, each operator stuffed from a single machine. And when this stuffer was empty, he had to stop to reload it—meaning idling of workers farther along the line. Time was lost either in machine-linking frankfurters and sausages or in hand-tying and racking larger types of sausage products, like bologna, braunschweiger and minced luncheon meats.

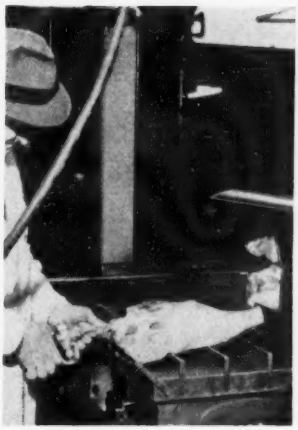
Operators pair up in the improved dual-stuffing system, and a third man devotes most of his time to keeping

Innovations in Curing and Smoking Rooms Bring New Efficiency

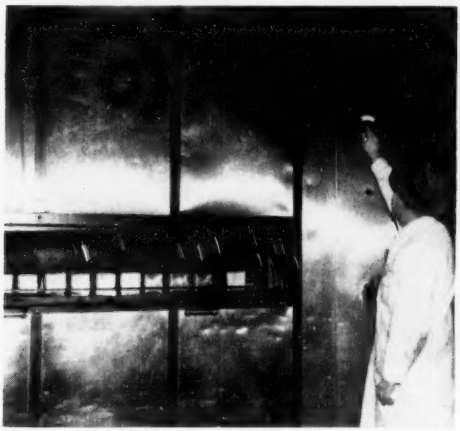
DEFROSTING of meats is simplified by using pipes to feed water into vats.



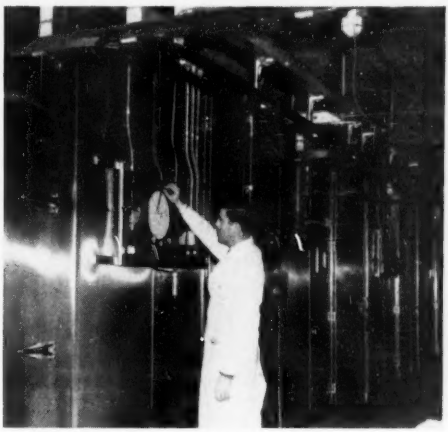
BRINE filtering system is used to purify pickling solution for . . .



ARTERY-PUMPING of hams. Over-under scale controls amount of pickle.



USING reel oven with automatic controls, considerable time and labor are saved, and meats baked uniformly.



DIFFERENT-SIZE smokehouses hold from 30 to 220 trees. Each house has temp recorders and controllers.

both stuffers filled. He opens the stuffing-cylinder lid, packs sausage meat into the unit, and seals the lid. The remainder of the time he racks sausage. The paired operators do two uninterrupted jobs of stuffing sausage meat into casings. They initially open the valve on the first stuffer unit and close the valve on the second. After the first stuffer runs low of material, valves are turned so that sausage meat flows from the second stuffer. And meanwhile the first unit is refilled.

3—Oven Is a Time-Saver

Installation of a new gas-fired, reel-type baked meat loaf oven with an automatic temperature controller has also raised efficiency in the sausage department. By merely setting the controller dial on the oven to the desired temperature, the attendant is now free for other duties, such as loading meats into nearby smokehouses.

Formerly, the attendant devoted considerable time adjusting the temperature of the oven and sticking a thermometer in the loaves to learn when to terminate the cook. But with the new system, there is no time lost in babying the oven. The attendant simply reads the internal temperature of the meat loaves after about an 8-hr. cook—the controller keeping oven temperature uniform.

There are other advantages in using the new oven: More uniformly baked loaves are now turned out in shorter time with less labor and fuel consumption. Reason: Fluctuations of the temperature of the oven have been minimized.

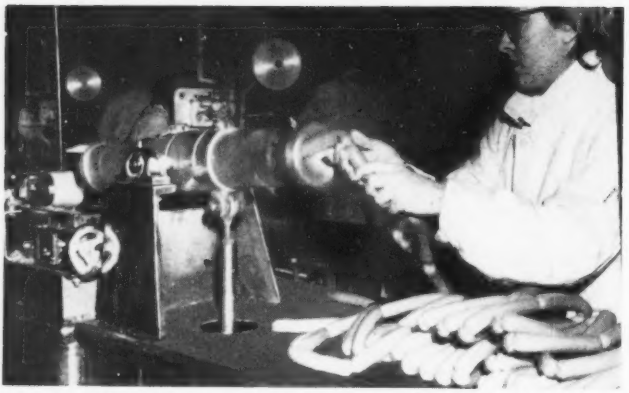
The new unit has several sanitary features. Since the oven is constructed of stainless steel, it is rust-proof and easy to clean. It also has oil-sealed drives.

4—Multi-Purpose Smokehouses

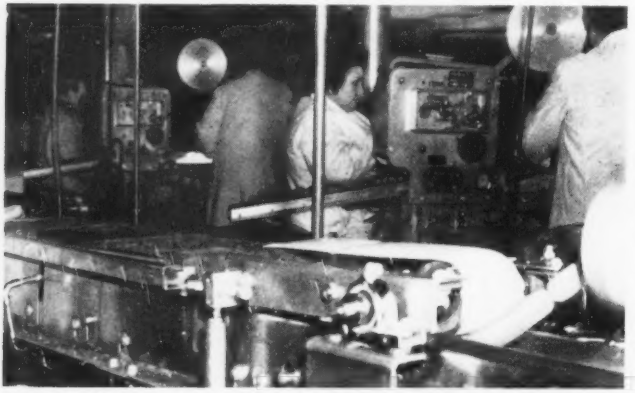
Still another outstanding improvement for boosting productivity has been installation of the new multi-purpose, stainless-steel smokehouses, which have also brought about a marked rise in the quality of smoked meats.

Designed according to this meat packer's specifications by Atmos

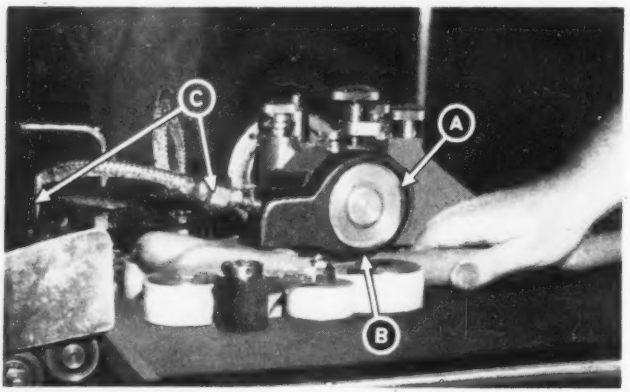
Speedy Unit Skins 400 lb. of Franks per Hour



FIRST, long line of wieners is fed into vibrating plastic tube, where strings, twisted around casings to form individual franks, are removed. Electromagnet vibrates plastic tube 120 times per minute.



NEXT, frankfurters travel through 100-deg. F. water bath. Here, warm water softens the cellulose casing to make it easier to strip off. Two machines in background automatically band skinless franks, cartridge-like in units of ten.



FINALLY, cutting wheel (A) slits casings as plough (B), alongside cutter, peels them back. Air from jets (C), loosens and blows off casings.

Corp., Chicago, these new units are employed to smoke and to wash treed meats immediately after smoking. Cooking of frankfurters—a process that follows smoking—is also carried out in these smokehouses without additional handling of cages. And by reducing handlings in this manner, overall time for frankfurter-processing has been considerably shortened.

The smokehouses have 2 in. of insulation in floors, walls, and doors, plus 4 in. the ceilings. All joints are smoke- and vapor-sealed, and the doors are sponge-rubber gasketed.

The filling of various-size loads of meats into smokehouses was always troublesome. Sometimes the loads were too big for one house to handle, this caused loading delays; at other times they were too small for the capacity. In either case, production efficiency was impaired.

But executives at Boston Sausage & Provision Co. came up with the solution when they designed the new smokehouses. They varied the sizes of the smokehouses and installed a different number of monorails in them. So now specific smokehouses can be used in accordance with the take-in schedule.

The company has four single-level smokehouses that hold 220 trees—enough for four carloads of hams. One 5-rail house has 70 trees. Two 4-railhouses each has a capacity of 60 trees. And the fourth—a 2-rail house—contains 30 trees.

Temperature and relative humidity in each house are automatically controlled and recorded. Hot conditioned air is admitted in alternate cycles through ceiling-level ducts, which are connected to banks of air jets along both sides of each smokehouse. Leaving the jets, the hot air strikes the floor, where it mushrooms upward through the meats until it is finally discharged through ducts located in the center of the house. Air, heated by Aerofin coils, is distributed to the houses by a central fan.

Additional air jets have also been installed in the larger 4- and 5-rail houses—one bank of jets for each rail. Flow of incoming hot air is alternated for each rail so as to minimize turbulence and uneven distribution.

Houses can be rapidly heated. It takes about 15 min. to raise the temperature of a house from 70 to 180 deg. F.

Smoke is furnished by a central generator. And before smoke enters a house through the hot-air ducts and jets, it is filtered to remove dust and soot.

Cooking, as stated, is also carried out in the smokehouses. Live steam is admitted through the same ducts

and jets used for hot air and smoke.

Notable savings in sanitary maintenance have now been attained in these smokehouses, for two reasons: Highly polished stainless-steel surfaces are easier to clean, and sloped floors permit complete drainage of clean-up and showering waters.

What's more, since stainless steel does not corrode, there is no longer any accumulation of grease and creosote on the formerly corroded smokehouse surfaces. As a result, stale odors do not form, and all meats have a fresh-smoked aroma.

Showering—the step after smoking—washes off surface grease, leaving the meats brighter looking, and it cools the products. It also makes it easier to remove stockinettes, thus minimizing the amount of torn flesh that remains.

5—All-Aluminum Packing Room

In the recently constructed aluminum-lined sausage-packing room, sausages and frankfurters are packaged, and wieners are also machine-skinned and banded. Temperature of this room is maintained at 45 deg. F. Ceiling, walls, ducts, columns, and doors are covered with heavy-gage aluminum.

There are a number of advantages in using aluminum: The room now has a modern, glistening, kitchen-like appearance, pleasing to workers and plant visitors because of its cleanliness and brightness. Infiltration of moisture—regarded as insulation's No. 1 enemy—is eliminated by the vapor-resistant metal. And moisture, which condenses in this high-humidity room, does not rust or corrode the aluminum.

The smooth, hard-surfaced sheets are also more sanitary than the former painted walls and ceilings. Surfaces are now easier to clean. There being no paint, no paint peels can fall from the ceiling and walls and contaminate meats. And microorganisms cannot readily multiply on the highly-polished metal sheets.

Moreover, the aluminum sheets are fire-proof and rodent-proof, and they do not absorb odors and grease.

6—Machine-Skinning Franks

Adoption of a high-speed, automatic frankfurter-skinning machine was the sixth notable improvement. This unit takes a long line of frankfurters and removes cellophane casings from them at the rate of about 400 lb. per hr. Let us describe the steps from the beginning:

First comes preparation of the franks for feeding into the skinning machine. Stickloads of wieners are taken off racks and loaded onto a 2x4-ft. stainless-steel table. Each stickload contains a long string of frankfurters. And strings of wieners are tied together for continuous delivery into the skinner.

Next step is removing the strings twisted around the casings to form the individual franks. The long line of wieners is fed by hand into a 4-in. dia. and 2½-ft-long plastic tube. And from then on, an attendant only has to tie together stickloads of frankfurters. Strings are shaken off the franks inside the tube, which is vibrated 120 times per minute by an electromagnet.

Destringing is done for two reasons: To separate individual frankfurters, and to facilitate removal of the cellophane casings during the cutting operation.

Softening the casings is the third step. Leaving the vibrator, the destringed frankfurters next contact an 8-in.-wide and 2½-ft.-long rubber-belt that guides them into a 100-to-110 deg. F. water bath in a metal vat covered with a Plexiglas hood. Warm water softens the casings, making it easier to strip them off the frankfurters.

Final step is cutting and removing the casings from the frankfurters. Emerging from the water bath, the wieners are slid over a ½-in.-wide metal plate and are held in position by tension belts. Mounted on a spring, the plate forces the frankfurters upward against the cutting wheel. As the casing is split, ploughs alongside the cutting wheel peel it back. From a jet, air under 60 lb. pressure loosens the casings on the frankfurters.

Then, the skinned franks pass over two 2-in. dia. stainless steel horizontal rolls. Here air from another jet blows the casings off the frankfurters, and

(*Turn to page* 200)

ALUMINUM-LINED sausage-packing room is notably spic and span. Room pleases both workers and visitors because of its cleanliness.

PLASTIC trays are filled with franks for weighing on packaging line. New trays are lighter, "quieter," and easier to keep clean.

"How" and "Why" of Danish's

Grade A Milk Powder

Coast company first removes cream from top-quality milk, then concentrates and dries skim at low temperatures to form easily reconstituted product

E. C. RITCHIE and G. SMITH

Laboratory Technician and Plant Superintendent, respectively, Danish Creamery Co., Fresno, Calif.

It was strong demand that created the Grade A milk powder now being produced by Danish Creamery Co., Fresno, Calif.—an industrial demand arising from the need for a product processed at low temperatures and having quality characteristics equal to those of Grade A market milk.

This demand has originated mainly from those states where laws prohibit the use of lower grade powder, especially when it is to be employed to increase the solids-not-fat in fluid milk and in some kinds of cheese.

Milk available to the Danish Creamery Co. is ideally suited for the manufacture of this product. It more than meets the California regulations, which stipulate a maximum of 75,000 organisms per ml. for Grade A milk. And, also, it meets the regulations of the company's own city of Fresno (50,000 per ml.).

In fact, the normal count for this grade milk averages 700 to 10,000 bacteria per ml. Other official regulations, such as relating to health of cows, dairy inspection and cooling procedures, are rigidly adhered to by dairymen in this milk-shed.

Use of this high quality raw product results in a finished powder with bacterial counts ranging from a few hundred to a few thousand per g. The drying process is largely responsible for this decreased count. And, due to the low moisture content of the finished product, these organisms fail to increase in number.

One of the main characteristics that makes this powder desirable for manufacture of specialized products is its unchanged albumin. This stability results from the fact that the low temperatures used in the process—155 deg. F. in first stage of vacuum pan, 115 F. in second stage, 305 F. entering dryer, and 170 F. at discharge—have no significant effect on albumin.

In addition to the previously named applications, this powder is used in the manufacture of candies, cakes, ice cream, sherbets, pancake and waffle mixes, meat loaf products, and some baked goods, soups and chowders.

Soft cheese volume may be extended 100 percent or more, with no depreciation of quality of the resulting product, by addition of this powder to skim milk. When used for this purpose, it eliminates need for the additional vats that would be necessary if straight skim milk were employed.

Soft cheese, used for cheese cake, may be made overnight by reconstituting the powder with water, adding starter, and permitting the mixture to stand at the proper incubating temperature. Since this cheese is sweetened with sucrose, or other sweeteners, the additional lactose in the powder is of value.

However, for products such as cottage cheese, the use of quantities that more than double the solids content of the skim milk may result in a cheese that would be too sweet. In production of cheese from this fortified skim milk, the amounts of starter and rennet must be adjusted accordingly.

Another application for the product is to mix it with an equal part of water and add this to light cream to manufacture a whipped "cream" lacking in richness. Moreover, it is an important source of solids in the manufacture of a competitive type of buttermilk. Also it may be used in the manufacture of chocolate milk and other milk drinks to improve flavor as well as to increase the yield.

Stringent Laboratory Controls

To protect the quality of the product, and also to comply with regulations, the laboratory checks the powder carefully. Samples of batches are plated and their bacterial counts estimated and recorded. The toluene distillation method is used to ascertain moisture content, which must be about 4 percent to prevent spoilage and lumping in packages.

Because flavor is of prime importance, organoleptic tests are made to discover "scorching", "oxidized" or "cooked" flavors in the product.

Sediment is important, too, since it indicates variations in the drying process. To determine whether excessive temperatures have been used, the product is analyzed for coagulable albumin. The reconstituted powder is coagulated with hydrochloric acid and saturated sodium chloride. After filtering, the resulting filtrate is boiled for 10 min. The amount of precipitate indicates temperature of drying—for a highly-heated milk such as condensed or high-heat powder shows no precipitate on boiling.

Titratable acidity, minimum fat (about 0.6 percent), and solubility are also determined.

Process and Equipment

Separating

In *Receiving Tanks*, fresh milk is cooled from 48-50 deg. F. to 36 F. Then, when processing starts, milk goes via *Pump* to a *Heat Exchanger* and is warmed up to 105 for efficient separation. It next flows to *Separators* that remove all but 0.03 percent of butterfat. Remaining skim is then heated (again in exchanger) to 165 F. (at this heat albumin is not coagulated). Skim now flows to intermediate *Storage Tanks* that supply . . .

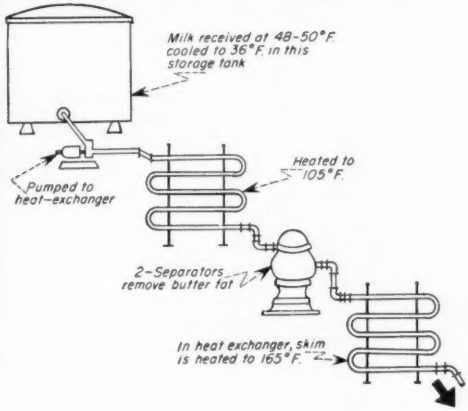
Concentrating

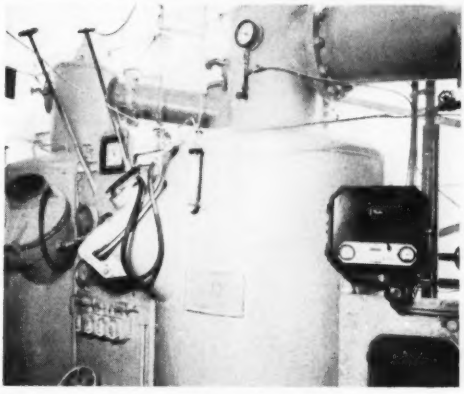
. . . *Vacuum Pans* (each with 2-effects) that concentrate the skim to 40 percent solids. Product then passes through a *Filter*, is cooled (exchanger) to 40 F., and pumped to *Large Storage Tank*. Then concentrate is heated (another exchanger) to 150 F. It is now forced, at 1,800 psi. by *High-Pressure Pumps*, to . . .

Drying

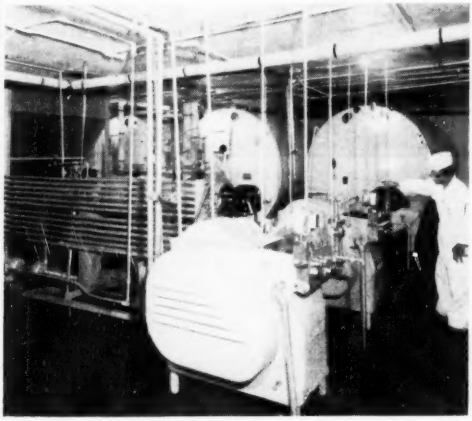
. . . *Spray Dryers*, each handling 225 gal. (1,600 lb.) of concentrate per hr., producing a 4 percent moisture powder. This is carried by *Conveyor* to a *Shaker* that separates the coarse particles (used for feed), from the fine Grade A product. Latter is packaged in 225 lb. *Drums*.

Photo-Diagram Depicts Process

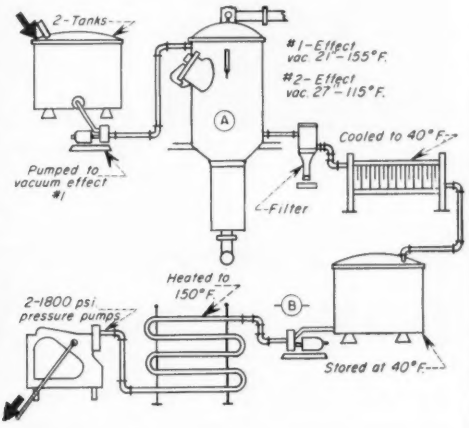

Milk received at 48-50°F. cooled to 36°F. in this storage tank
Pumped to heat-exchanger
Heated to 105°F.
2-Separators remove butter fat
In heat exchanger, skim is heated to 165°F.

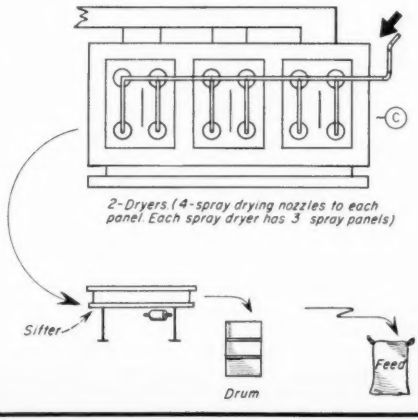


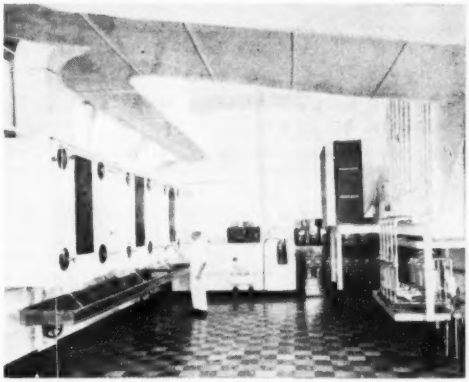
A (drawing below)—Warm skim milk is pumped from storage tanks to these vacuum pans and concentrated to 40 percent total solids.



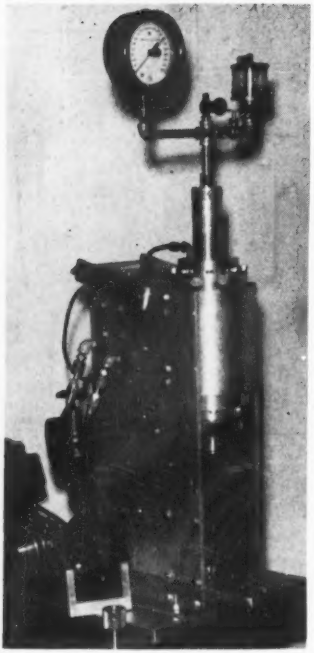
B (drawing right)—Condensed milk is pumped from tanks (rear) through heat exchanger. Then high-pressure pumps (foreground) deliver it to the two dryers.

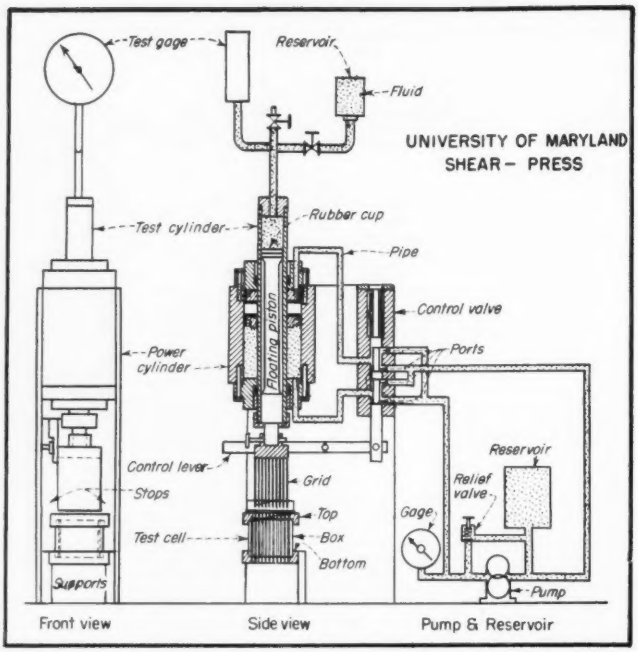






C (drawing left)—One of the dryers. Air is filtered, heated and delivered to the three panels (left). Each panel also has four milk-inlet nozzles.





DEVELOPED to provide needed quick test of raw vegetable quality, shear-press uses hydraulic pressure to force series of metal plungers through product in metal box. Back-pressure on floating piston in test cylinder pushes against hydraulic fluid to actuate tenderness gage atop tester.

New Shear-Press Predicts Quality of Canned Limas

Operating on Tenderometer principles, this tester achieves precision because gage is actuated by direct hydraulic force

AMIHUD KRAMER, KAARE AAMLID, R. B. GUYER and HATTON ROGERS

First three authors, University of Maryland, College Park, Md.; fourth author, Phillips Packing Co., Inc., Cambridge, Md.

Rapid and accurate estimate of the quality of raw lima beans is needed by processors.

The usual method of determining quality on the basis of percent white beans is, of course, not applicable to green-seeded varieties. Moreover, there is a definite indication that the percent white lima beans may not necessarily be closely correlated with the average maturity, and especially the hardness, of the product.

Take, for example, the case of a very uniform pod set. Here, 20 or 30 percent whites which have just turned color, and are not shriveled, will result in a sample that is not as hard as the percent whites might indicate. Now consider another situation, where the material is extremely variable because of an early, small first set, preceding the main pod set. In this case, considerably less than 20 percent of whites—which may have shriveled and hardened practically to the seed stage—would result at harvest in an overall harder and less acceptable processed product.

Work with a hydraulic Tenderometer made experimentally by Food Machinery & Chemical Corp.[1] indicated that the Tenderometer principle would be applicable to quality evaluation of raw lima beans. With this hydraulic Tenderometer, however, the measurements are made by a gage connected directly to the power unit, which would be equivalent to the gage shown at the bottom (right) of our drawing. So results were not as precise as we desired.

In the recently developed shear-press[2], the recording device is actuated by a system entirely independent of the hydraulic power used to activate the instrument. It is thought that this difference primarily accounts for the greater precision obtainable with the shear-press.

The performance of this instrument has been tested on 120 samples of raw and canned lima beans. A correlation of 0.98 with the alcohol-insoluble solids test (A.I.S.) and 0.93 with taste-panel grades on the canned product (Table I) show that the shear-press may be used on raw lima beans to predict the quality of the canned product.

For the green-seeded varieties, especially, shear-press values provided more accurate measures of quality than percentage of white or shriveled

How Shear-Press Operates

The shear-press consists of five main parts: (1) A suitable test cell and grid (series of plunger plates) designed for a given vegetable (or vegetables) and interchangeable with other test cells designed for other vegetables; (2) a test cylinder with floating piston attached to grid to transmit force applied to vegetables to hydraulic fluid which actuates tenderness gage; (3) a power cylinder to provide the actuating force; (4) a valve to control the direction of travel of the test cylinder; and (5) an electrically operated hydraulic pump.

The operation for a material such as lima beans is as follows:

The test-cell box is placed on a bottom grid plate and a sample of beans is placed in the box and leveled. Then a top grid-plate is placed on the box, and the entire assembly is slid into the machine.

The electric motor which operates the hydraulic pump is then started, forcing oil through the control valve and back to the pump. The pump may operate continuously, causing oil to flow only against the resistance of the piping and control valve.

When the control lever is pressed down, the power piston descends. The grid enters the slots in the top plate, then passes through the beans and the slots in the bottom plate.

Resistance of the beans to the passage of the grid is measured by the test-cylinder gage at the top of the tester. This resistance exerts an upward force on the piston inside the test cylinder as the power cylinder pushes downward. The top of the test-cylinder piston, in turn, pushes against hydraulic fluid in the top of the cylinder. It is this upward force that actuates the test gage to indicate the tenderness of the vegetables.

The University of Maryland does not manufacture the shear-press for sale, but a limited quantity of them will be made in time for the coming canning season by Food Machinery & Chemical Corp., Hoopeston, Ill.

beans, or the method used to determine the U. S. grade for raw lima beans.

Discussion of Results

After the basic test data were obtained, the coefficient of variability was calculated from the replicate shear-press value. This indicates that a single shear-press determination would be expected to vary from the true reading by not more than about 2½ percent. If more than one determination is made and the replicates averaged, the average would, of course, be expected to approach even more closely the true mean.

These shear-press data were obtained by filling and leveling the test cell. If the sample were obtained by weight instead of by volume, the result might be expected to be somewhat more precise[2].

The average variability for field-run Henderson lima beans was 2.32, and for Thorogreen 2.49. For graded samples it was only 2.01.

A somewhat lower variability of 2.24 for the small Evergreen variety, and a greater variability of 2.66 for the large-seeded Peerless variety, indicate that greater precision may be obtained by the use of a greater number of individual beans in the sample.

The correlation coefficient of 0.93 between shear-press values and panel grades on the canned samples would be even better if the Henderson and green-seeded varieties were handled separately. Thus, the correlation coefficient for Henderson only was 0.96.

On the average, judging from the U. S. grade data, it would appear that lima beans having a shear-press value of less than 650 lb. would be fancy. Those from 650 to 850 would be extra standard, and those from 850 to 980 would be standard in quality (Table II).

It has been shown previously[1] that above the substandard range, alcohol-insoluble-solids percent is a satisfactory test of quality for canned lima beans. It is not satisfactory in the substandard range because dry lima beans are capable of absorbing enough water so that the alcohol-insoluble-solids percent of such soaked limas will be lower than the alcohol-insoluble-solids of other limas canned fresh.

Results obtained with the above samples provided a correlation of 0.92 between alcohol-insoluble-solids and panel results, again demonstrating that the A.I.S. test is a good one for canned lima beans.

By interpolation from U. S. grades, it appears that 22 percent A.I.S. is about the dividing line between fancy and extra standard. And perhaps 25 percent is the line between extra standard and standard.

As with the shear-press values on the raw limas, the results with A.I.S. also can be improved when the varieties are handled separately.

When the shear-press values were correlated with A.I.S. percent, the correlation resulted in the 0.98 value, indicating very close agreement between these two tests and also showing that there was no varietal difference in this relationship. Because of this high correlation, it is possible to predict A.I.S. values on the canned product from shear-press values on the raw product with a high degree of accuracy.

U. S. Raw Grade

A comparison of shear-press values with the official U. S. grade on the raw limas showed a reasonably good correlation of 0.87. Here again, when the varieties were handled separately, a correlation of 0.92 for Henderson indicated that the U. S. grader was doing a reasonably good job of estimating the hardness of this variety.

However, a significantly lower correlation of 0.84 for the green-seeded varieties showed that, in the absence of the tell-tale white color, the official grader did a significantly less reliable job of grading for hardness. This fact is brought out again in the relationship of the U. S. official grade for the raw limas to the panel grade of the canned limas. Here, the overall correlation is 0.86. However, the correlation for Henderson alone is extremely good, being 0.96, with the correlation for the green-seeded varieties being only 0.79.

In contrast to the excellent agree-

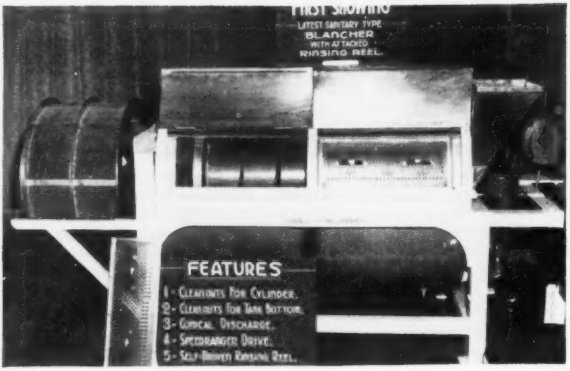
(*Turn to page* 187)

TABLE I—CORRELATIONS Between Objective Tests and Panel Grades for Maturity of Raw and Canned Lima Beans

Tests	Panel Grades				Shear-Press
Raw Beans	All Small Seeded	Henderson Only	Green Seeded Only	Large Seeded Peerless	
Shear-Press (lb. press.)	0.93	0.96	0.93	0.76	....
U.S. Grade (calculated)	0.87	0.96	0.79	....	0.87
White Beans (% weight)	....	0.64	....	....	0.66
Shriveled Beans (% weight)	....	....	0.77	....	0.76
Canned					
A.I.S. (%)	0.92	0.93	0.95	0.75	0.98

TABLE II—SUGGESTED LIMITS for Maturity Grades of Lima Beans.

	Shear-Press		A.I.S.	
	Panel	U. S. Grade	Panel	U. S. Grade
Fancy-Extra Standard	450	650	17.0	22.0
Extra Standard-Standard	700	850	23.0	25.0
Standard-Substandard	850	980	26.5	26.5

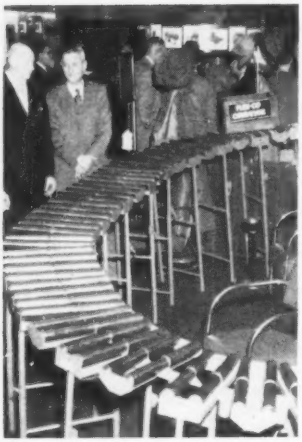


IMPROVED BLANCHER with special sanitary features was shown by Huntley Mfg. Co., Brocton, N. Y. Clean-out doors on cylinder and water tank are said to lower maintenance. Unit includes variable speed drive. Integrated rinsing reel optional.

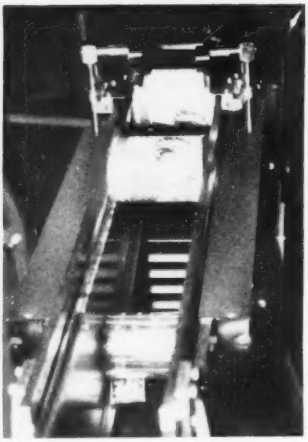
SELF-CENTERING PULLEY eliminates sideguards on conveyors. Displayed by U. S. Steel Corp., New York, device employs a slightly crowned roll cut transversely at center with two halves rotating as unit. This rotation confers self-centering action to belt.

THESE NEW CANNING UNITS

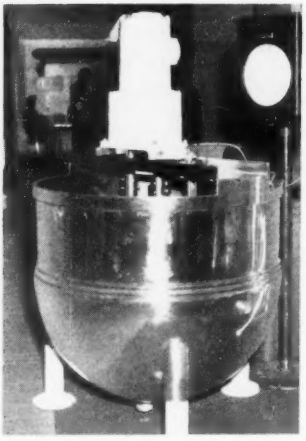
Show Highlighted by



ROLLER CONVEYOR that requires no corner posts or guard rails. Exhibited by Berlin Chapman Co., Berlin, Wis., it comes in sections that are adjustable in height. Construction also permits the forming of curves.



CAN EJECTOR for defectively labeled or unlabeled cans was displayed by Ace Specialty Mfg. Co., Los Angeles. Machine spots and throws out loose, double, dog-eared labels. Handles 1,000-plus cases per hr.



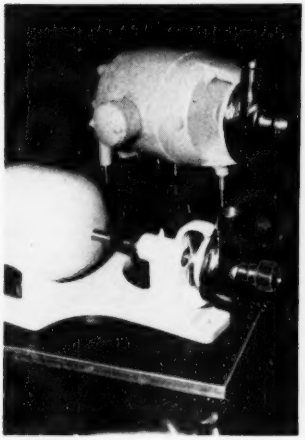
FASTER COOKING is reported with new stainless steel kettles offered by Groen Mfg. Co., Chicago. Over-size jacket with multiple steam inlets and special baffle-nozzles are said to cut cooking time 50 percent.

EMPTY CANS are removed from single-depth cases speedily in unit developed by Barry-Wehmiller Machinery Co., St. Louis. Case is opened, then electromagnet picks up and deposits cans on unscrambling belt. Handles 648 cans per min.

PEAS AND BEANS are filled into cans and accurately syruped at high speed without spillage. Made by Food Machinery & Chemical Corp., Hoopeston, Ill., machine comprises two units—one for products, one for brine. Fills 400 cans per min.

CAUGHT EYES AT CHICAGO

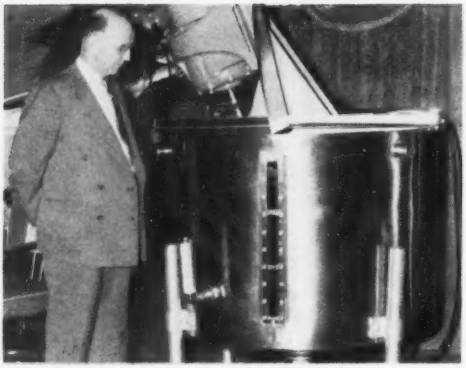
Advances in Design



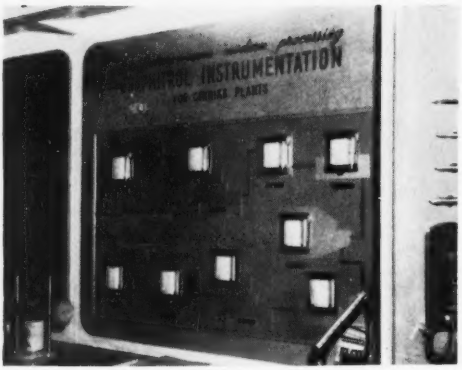
SANITARY PUMP driven by uncrevassed, fully enclosed Scott motor, is development of Tri-Clover Machine Co., Kenosha, Wis. Unit bolts to floor. Featured is demountable pump head with clip-on impeller.

ASEPTIC CANNING system components were displayed by W. F. & John Barnes Co., Rockford, Ill. Can sterilizer with steam superheater feeds containers to valveless straight-line filler at speeds up to 300 per min.

Turn Page for More New Canning Units ⟶

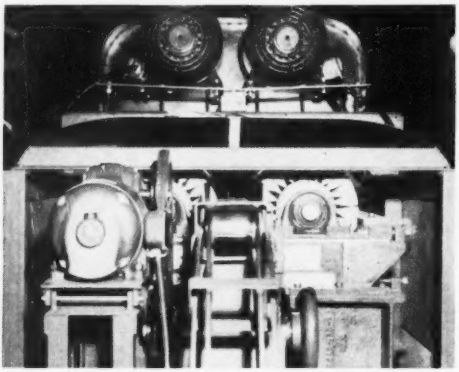


SANITARY MIXER exhibited by The United Co., Westminster, Md., features angular-mounted paddles that avoid centrifugal action, and calibrated glass window. Steam-supply unit and paddles instantly removable for cleaning.

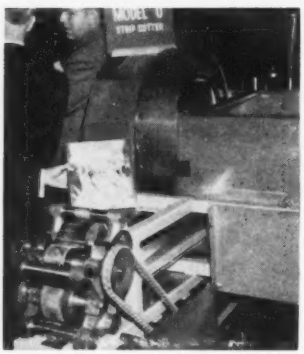


CONTROL PANEL graphically depicts canning process. Featured are individual recorders that enable easy check of all plant process conditions. Exhibitor: Taylor Instrument Co., Rochester, N. Y.

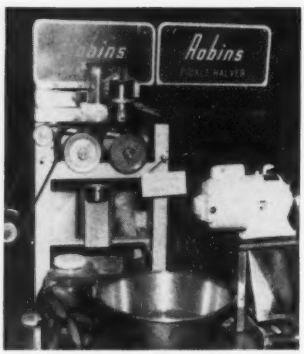
SYRUPER reported accurate to 1/10 oz. was introduced by Chisholm-Ryder Co., Buffalo. Unit has rubber middle valve seat, displacement plug-type valve. Tank is raised or lowered hydraulically. Will syrup 130 cans per min.



CAN END CLEANER, adjustable for various container sizes from 8 through 46 oz., was displayed by Rex Div. of Chain Belt Co., Milwaukee. Cans are conveyed between two rotating brushes. Handles up to 300 cans per min.

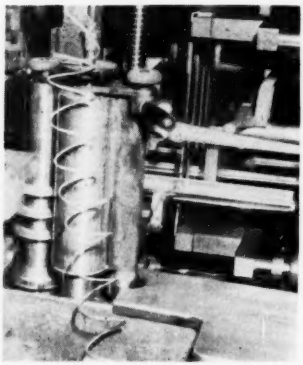


POTATOES are automatically cut into French fries or julienne strips at rate of 1,200 to 4,000 lb. per hr. on new unit displayed by Urschel Laboratories, Inc., Valparaiso, Ind. It takes potatoes up to 4 in. wide and cuts strips 5/32, 1/4, 3/8, 1/2 in. square.

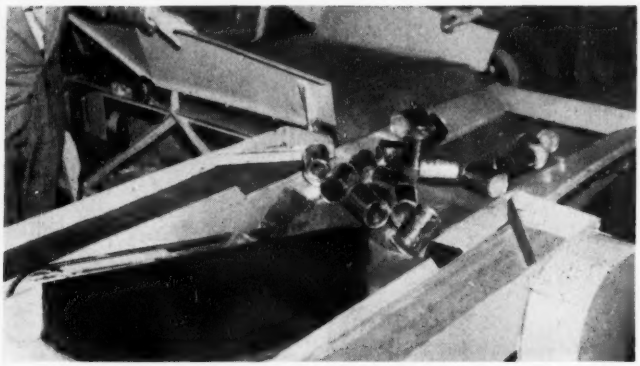


PICKLE SLICER that delivers 4, 6, or 8 clean-cut pieces was exhibited by A. K. Robbins Co., Baltimore. Employs stationary cutter with three interchangeable heads. Has adjustable inserts for different size pickles. Rubber feed rolls insure clean cuts.

HULLS and other extraneous matter removed from beans or peas by pneumatic separator shown by Electric Sorting Machine Co., Grand Rapids, Mich. Products, fed by vibrator, fall into air-stream that separates and discharges hulls to waste.

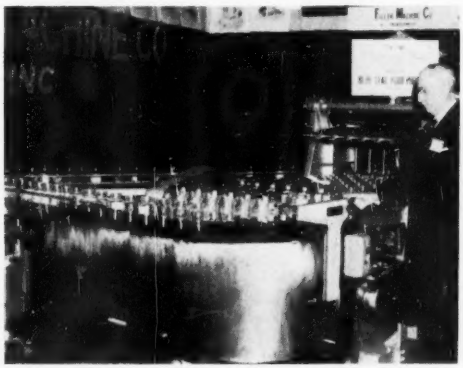


LABELER with continuous feed, for handling containers of 2-7 in. dia. at high speed. It was shown by Standard Knapp Div., Hartford Empire Co.

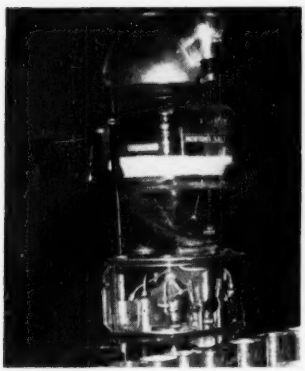


RETORT BASKET DUMPER AND UNSCRAMBLER of new design. Maker: Dixie-Way Machine Co., Lakeland, Fla. Unit has automatic locking lid that holds cans in place as basket is inverted over 36-in. wide belt. Will handle 400 cans per min. Unscrambler discharges onto two inclined belts.

FINAL INSPECTION TABLE of transparent plastic shown by Productive Equipment Corp., Chicago. Inclined, sanitary, trough-like top is illuminated from below to permit easy spotting of foreign matter.



ROLL-OVER MECHANISM inverts glass jars for cleaning then uprights and feeds them to 6-line mayonnaise filler. Air-blast dislodges foreign matter, vacuum removes it. Exhibitor: Filler Machine Co., Philadelphia.

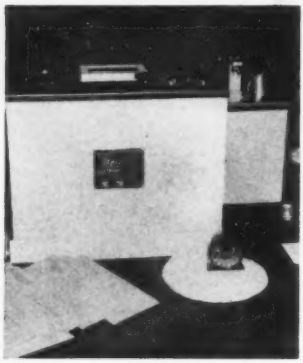


BULK SALT, or mixtures of salt, sugar, or other ingredients, are accurately metered into cans or jars at production-line speeds by machine which Morton Salt Co., Chicago, exhibited. Feed is easily adjusted. Air-agitation prevents clogging.

UNIFORM BLENDING of mixtures of salt, sugar, or other ingredients for unit (preceding photo) is performed in tumbling type McLean mixer also displayed by Morton. Unit by Anglo Amer. Mill Corp., Owensboro, Ky.

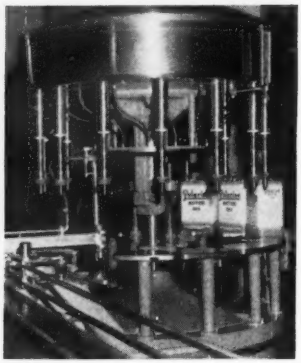
CONTINUOUS DENSITY CONTROL of liquid products is possible with new sanitary unit shown by Minneapolis-Honeywell Regulator Co.'s Brown Instrument Div. It is stated accurate within 1/10 deg. Brix.

Turn Page for More New Canning Units ⟶

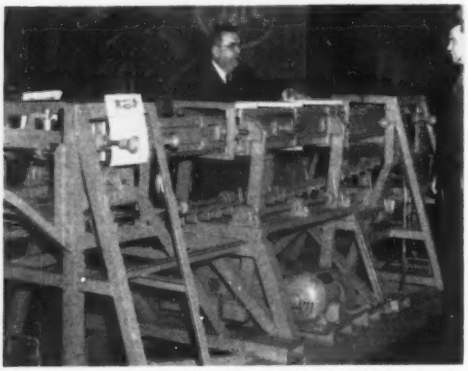


MOISTURE TESTER that operates on new principle. Exhibitor: Seedburo Equip. Co., Chicago. Test involves adding solvent to weighed sample and filtering into liquid cell. Has calibrations for many foods.

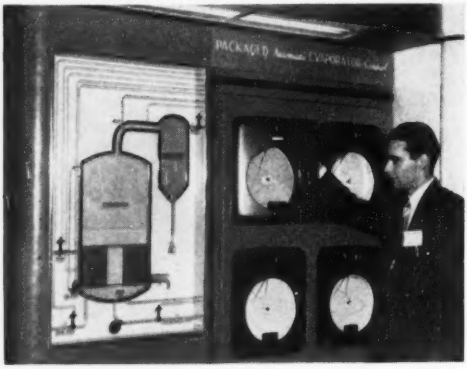
VEGETABLES are uniformly salted by unit that adds one tablet to each container. Positive salting is assured by micro-switch that stops machine if dispenser jams. Maker: Scientific Tablet Co., St. Louis.



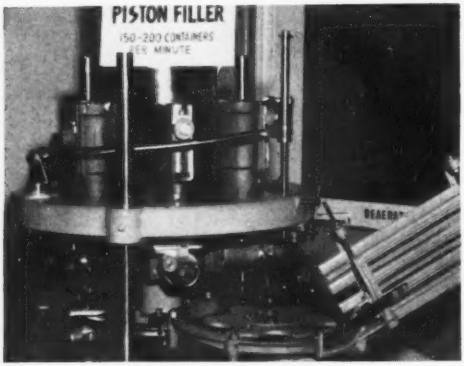
TWO-GALLON CONTAINERS are filled at rate of 30 per min. on fully automatic rotary gravity unit of Horix Mfg. Co., Pittsburgh. Compressed air cleans each vent valve before can is filled. Also fills 1-gal. cans.



IMPROVED HIGH SPEED SHAKER for mixing corn or other products in cans is demonstrated at exhibit of The United Co., Westminster, Md. Machine has frequency range of 240 to 600 cycles per min. Can capacity is variable while machine is operating.



EVAPORATOR CONTROL "PACKAGE" consisting of four integrated instruments was simulated by The Foxboro Co., Foxboro, Mass. System, piped and wired ready for installation, controls evaporator steam pressure, liquid level, density, and absolute pressure.



FILLER to supply demand for medium speed machine having accuracy of fill and ease of cleaning of larger units was displayed by The Pfaudler Co., Rochester. Fill adjustment accurate to within 1/10 oz.

DISPENSER automatically feeds, moistens, and cuts 1 to 3 in. gummed tape into lengths selected by telephone-type dial. Has electric water heater. It was displayed by Marsh Stencil Machine Co., Belleville, Ill.

OPERATION PRIORITY

Effects of restrictions on availability of equipment and materials for food processors. How you should go about getting what you need. And what agencies and people you will deal with in Washington

UNDER the Defense Production Act of 1950, the President has delegated the responsibility for food to the Secretary of Agriculture. However, the National Production Authority of the Department of Commerce has the legal responsibility to allocate scarce materials for essential civilian production, as well as for the defense production program. At present, however, priority ratings are being extended only to defense procurement and the most critical of civilian needs.

Under NPA Regulation 4, effective Feb. 27, 1951, industry is allowed to purchase during 1951—for *maintenance, repairs and operating supplies*—materials and equipment containing frozen basic materials such as iron and steel, aluminum and copper in amounts limited to expenditures in such categories during 1950. Any minor capital addition is limited to $750.

DO Rating Explained

For such purposes, NPA has authorized industry itself to use a "DO" Rating (Defense Order Rating) on all pertinent purchase orders. DO-97 is the number assigned for this purpose. Henceforth, industry must rate all its MRO purchase orders with the priority rating DO-97 so that the supplier can use it to replace the equipment or supplies purchased. It is only necessary to write on the purchase order "DO-97, Certified under NPA Regulation 4".

Copies of NPA Regulation 4 are obtainable from 13 Regional Field offices, of the National Production Authority, as well as 86 field offices of the United States Department of Commerce.

To purchase restricted new materials or equipment which do not fall in the MRO classification as explained above, it will be necessary to compete with defense requirements. And the latter already have caused dislocations of supply of certain items necessary in the manufacture of food processing materials and facilities. Since all DO orders have equal rating, whether for defense or civilian purpose, and since DO-97 ratings will be very voluminous, it is necessary that construction or equipment programs which exceed $750 for any one complete project be first authorized by NPA and be awarded a special DO rating for the specific purpose.

Only the most extreme hardship cases in those industries deemed most essential to the defense effort, or to civilian needs, have any chance to obtain a special DO rating at this stage. Therefore, any industry which is not primarily occupied with production approved by such defense agencies as the Department of Defense, Atomic Energy Commission, National Advisory Committee for Aeronautics, United States Coast Guard, Civil Aeronautics Administration, Secretary of the Interior (limited) and Secretary of State, should undertake concerted action to determine the *essentiality* of its products to the civilian economy.

Dairy Industry Shows Way

The dairy industry sets a shining example of a well-organized effort to protect the interests of all its members, large and small. It has set up task groups, and each segment has its own "Essentiality Committee". The latter committees have been very active, and there is no doubt that the dairy industry has greatly impressed executive Washington with its *essentiality* to both the defense program and the civilian economy.

The baking industry now is actively working to prove its essentiality. It has advised its members of the necessity of establishing the principle of essentiality as applying to ingredients, equipment, plant capacity, power, distribution facilities and manpower.

In case the above should contain even the slightest note of complacency, it should be remembered that Rated Orders (DO) do not apply to all the materials and equipment available. For instance, 70 percent of all machine tools produced are to be reserved for the armed forces or their prime or sub-contractors, with the remaining 30 percent to be distributed among all other purchasers. Thus, rated orders have call on only 30 percent of production in such a case (NPA Order M-41). For items affected by new stockpiling of critical materials, the situation may be even more difficult. Nickel-bearing stainless steel equipment used throughout the food industry is an example.

Who Has Charge of What

In keeping with his responsibility for food, the Secretary of Agriculture on Sept. 15, 1950, redelegated responsibility for planning and carrying out the Department of Agriculture's functions under the Defense Act of 1950 to Ralph S. Trigg, Administrator of the Production & Marketing Administration. As of Sept. 18, 1950, Mr. Trigg created:

1. The Office of Requirements and Allocations, to be responsible for assembling and evaluating current and long-range requirements of United States civilians, U. S. government agencies and foreign countries for domestically produced or imported goods, with F. Marion Rhodes as Director.

2. The Office of Materials & Facilities, to serve as the central coordinating point (under L. B. Taylor, director) for:

A. Developing basic policies and procedures governing the formulation of current and long-range requirements and determining such requirements for farm machinery, equipment and supplies . . .; food processing equipment, machinery and supplies; food and agricultural containers and packaging materials; fuels, lumber and lumber products; petroleum and petroleum products; materials for food processing, transportation, handling and storage facilities; and other materials, machinery, equipment and supplies necessary to accomplish agricultural food production, distribution and conservation.

B. Acting as claimant and providing agricultural representation on interagency committees concerned with such materials and supplies.

C. Formulating recommendations relating to allocation and control of above materials, equipment and supplies and administering distribution controls . . .

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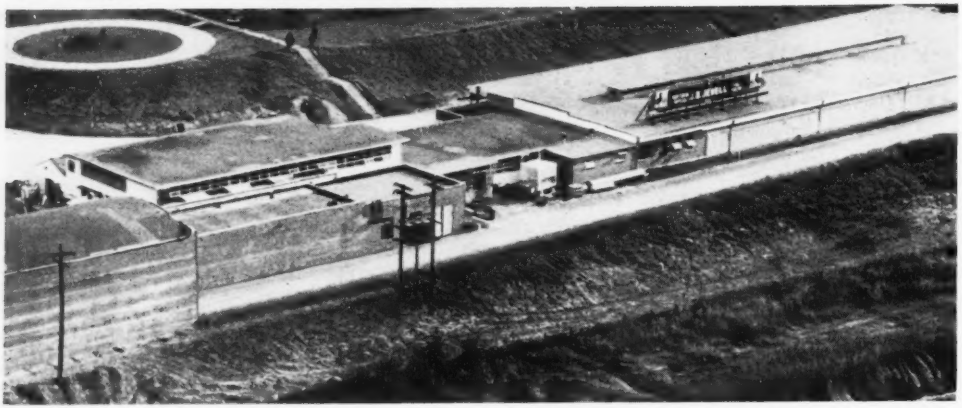
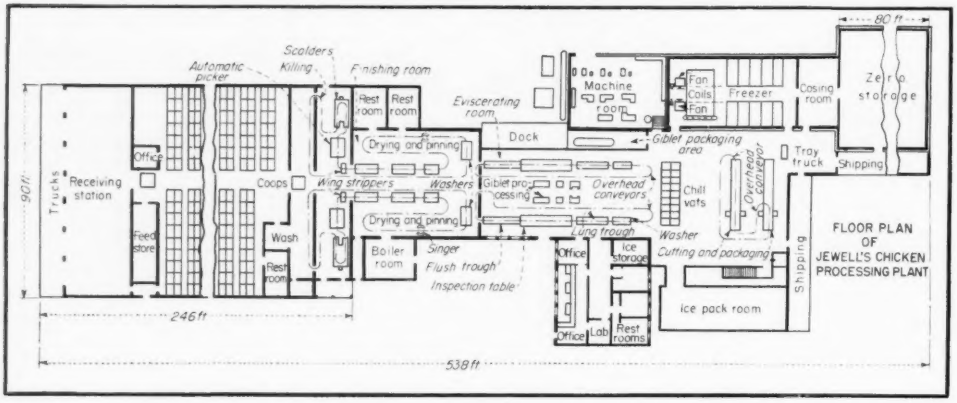
Processing Plant . . . Operational Layout



NEW POULTRY PLANT of J. D. Jewell, Inc., Gainesville, Ga., has capacity of 2,500 chickens per hour.

SCHEMATIC LAYOUT shows location of overhead conveyors and plant equipment. Processed birds are packaged, quick-frozen, and stored in 0 F. room.



Mechanizing Clinches Quality

Georgia plant assures top grade fresh-frozen chicken by applying latest equipment in "continuous uniformity" operation . . . Byproducts aid in "streamlining" costs

ARTHUR V. GEMMILL
Assistant Editor, "Food Engineering"

Use of advanced processing equipment that has brought continuous high-speed operations is largely responsible for the A-1 quality of fresh-frozen chickens produced by J. D. Jewell, Inc., Gainesville, Ga.

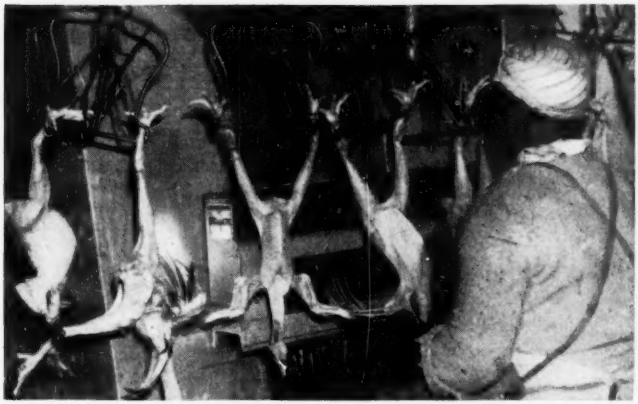
And the maximum mechanization employed in the modern plant, together with the complete utilization of all parts of the birds, including feathers and offal, pay off in low-cost operation.

Also, by keeping an eye on every stage of the poultry growing—from egg to 3-lb. fryer—the company insures quality in the "raw material."

In completing its second year as a producer of fresh frozen chicken, the company is now processing approximately 500,000 lb. of birds per week. Credit experience, too, for this progress. For the fact that the company had produced ice-packed chickens for years made it expertly familiar with the latest poultry-handling equipment and dressing methods.

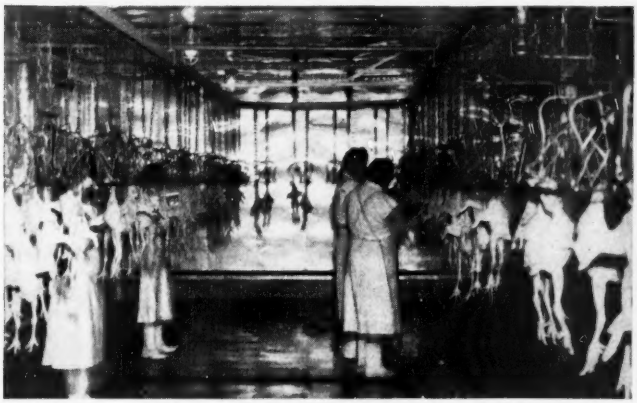
New Hampshire Red chickens, bred especially for their meat qualities, are now used exclusively. The company produces the chicks in its own hatcheries and furnishes them to the growers who are then paid according to their performance. The goal is to raise a

Here Are Steps Involved in Preparing Fresh-Frozen Chicken



1 WING STRIPPING. As chickens move from automatic picker, operator inserts wings between rotating drums that pluck off feathers.

2 LEG PICKING. Here, rotating rubber-fingered rolls pull feathers.



3 PINNING. As overhead conveyor moves birds around U, women remove pin feathers. Note stainless steel walls and ceiling that aid cleaning.

4 SINGEING. Flames from gas jets (arrow) automatically singe birds.

3-lb. chicken on 9-lb. of feed in 11-12 weeks. Field men assist the farmers in meeting this requirement.

A fleet of trucks, operated on a definite schedule, picks up the chickens at the proper time and moves them to the processing plant. Here, the birds are placed in feeding batteries, where they are fed a special diet to enhance the bloom of the carcass, and allowed to calm down before killing.

Continuous Operation

The plant is arranged for high-speed operation, with two separate processing lines, each having a capacity of 1,250 birds per hour. Chain-trolley type overhead conveyors are used to move the chickens continuously through the various steps of killing, picking and eviscerating. An additional overhead conveyor carries the chilled, eviscerated birds along the freeze-prepara-

5 EVISCERATING. As entrails are removed they fall into stainless steel trays attached to a conveyor and are examined by USDA inspector. Trough of running water (foreground) is for washing giblets.

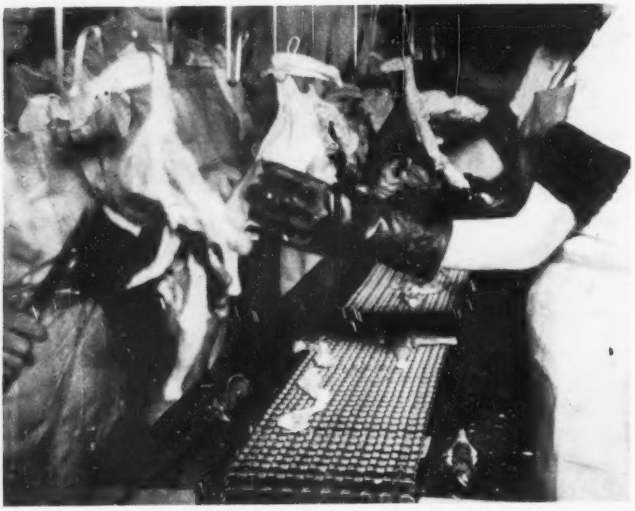
tion line. Here, fryers are cut-up and packaged for freezing.

The overhead conveyors comprise chains supported on trolleys that move along channels supported from the ceiling. Shackles, that hang from clamps which are fastened to the conveyor chain and extend through a slot in the bottom of the channel, hold the chickens at a convenient height for the operators.

After approximately 48 hr. in the feeding batteries, chickens are ready for processing. Batteries of coops are wheeled to the conveyor lines in the killing room. Chickens are then removed and hung by their feet on shackles attached to the overhead conveyors. As the birds enter the plant they are killed, scalded, and then move into automatic pickers.

These units have flexible rubber fingers about 14-in. long and ½-in. thick. The fingers are arranged along two opposing cylinders that rotate toward the center of the machine. In operation, they catch hold of the feathers and pull them from the bird's body.

Cutting Up and Packing for Freezing



PREPARING CUT-UP FRYERS. As the processed and cooled chickens move along overhead conveyor they are cut up into individual pieces that fall onto packing belt. Hand cutting insures absence of bone chips.

PACKING. Individual pieces are packed into 1- and 5-lb. cartons, check-weighed, then closed and trucked to quick-freeze tunnels.

Wing Feathers Removed

Upon leaving the pickers, the birds travel to wing strippers—one on each line. These units have two directly opposed rotating steel cylinders set close together. The operator inserts wings between the cylinders, and these pluck the feathers. At this point, the conveyors pass from the killing room into the finishing room.

Birds are then manually reversed on the conveyor line shackles—so that they now hang by their heads. This permits picking of the legs by passing the chickens through finishing units that operate similarly to the automatic pickers.

As the chickens pass from the last finisher, women remove pin feathers with special pinning knives. Then the birds are conveyed through the singers, where gas flames burn off the few remaining undeveloped feathers without injuring the flesh.

From here, birds move to washers, where cold water sprays are played on them. These accomplish two purposes: They wash off loose feathers, blood, and blood clots, and at the same time remove some of the body heat.

Enter Eviscerating Room

After washing, the chickens are transferred from the finishing conveyors to another pair of overhead conveyors that move them into the eviscerating room. Upon entering this room, legs are cut off and the oil sacks are removed.

As the birds move along on the conveyors, operators slit the neck skin and work it down the body. Then they loosen and remove the crops and cut the wind-pipe and gullet.

At this point, the overhead line passes above a series of stainless steel trays attached to a conveyor. One tray travels directly beneath each bird and catches the entrails as they are removed. These are examined by the USDA inspector for signs of internal disease.

The next operators snip out hearts and livers, wash them in running water, in convenient troughs, and deliver them to the giblet processing table. Gizzards are then removed.

The stainless steel trays continue on the conveyor and, as they travel over the end, dump their contents into an offal truck. Trays are then automatically washed as they move back under the eviscerating table.

The birds meanwhile travel to the finishing trough, where lungs and

(*Turn to page* 176)

A SPECIAL FOOD ENGINEERING REPORT

HOW WILL packaging-material shortages and restrictions hit your products?

EMERGENCY PACKAGING

What's Short ... How to Conserve and Substitute ... Pitfalls to Avoid

Processors today face numerous material scarcities within a narrowing framework of restrictions. Pressing problem is how to keep pace. Here's what foresighted food operators are doing to ease the pinch; how suppliers are helping with substitutes; and review of lessons learned in last war—all aimed to aid you in meeting your problem.

FACED with ever tighter restrictions on civilian use of critical materials and increasing shortages of packages and containers, food processors are now gradually shifting to suitable substitutes and stretching strategic supplies by setting up conservation measures.

These conditions have already created some strains on less critical and more available packaging materials and forced changes on packaging lines to handle substitutes. And, if the international situation becomes even more critical, there is bound to be a scurry from one substitute to another, depending upon which is more available.

Food processors already see the hand-writing on the wall. First came the DO-rating system, giving priorities to defense orders; then the conservation order, limiting the

PACKAGE SHORTAGES REPORTED

Processors Cite Scarce Materials; Squeeze Points Up Need for Studying Substitutes

Products	*Materials in Short Supply*
BABY FOODS	Metal containers, cellophane, sulphite paper, and shipping cases.
BAKERY PRODUCTS	Cellophane, waxed paper, waxed glassine, folding cartons, and shipping cases.
MALT BEVERAGES	Metal containers, bottles, and stainless steel barrels.
CONFECTIONERY PRODUCTS	Metal containers, aluminum foil, waxed and coated paperboard, glassine, cellophane, folding cartons, inner wraps for candy bars, and shipping cases.
COCOA	Shipping cases.
COFFEE	Metal containers and shipping cases.
DAIRY PRODUCTS	Cellophane and glassine. No shortage of material for fresh milk.
DESSERT MIXES, POWDERED	Cellophane, aluminum foil, glassine, and shipping cases.
EXTRACTS	Shipping cases.
FISH AND SEAFOODS	Cellophane, folding cartons, and shipping cases.
FRUITS CANNED	(Few find cans and cases in short supply.)
FRUITS FRESH	Cellophane, Pliofilm, polyethylene, mesh bags, and shipping cases.
MACARONI PRODUCTS	Cellophane, set-up cartons, and shipping cases.
MALTED MILK	Metal containers, metal caps for jars, drums, and shipping cases.
MAYONNAISE AND SALAD DRESSING	Shipping cases. (Glass containers, closures, and adhesives in good supply.)
MEAT PRODUCTS	Metal containers, aluminum foil, and most plastic films.
MUSTARD	Glass containers and shipping cases.
NUTS	Cellophane.
OLEO, LARD, AND SHORTENINGS	Metal containers, parchment paper, folding cartons, and shipping cases.
OLIVES	Shipping cases. (Glass containers and closures available.)
PEANUT BUTTER	Shipping cases. (Enough glass jars.)
SOUP MIXES	Aluminum foil and cellophane.
SUGAR	Paper and textile bags.
SYRUP	Glass containers and shipping cases.
VEGETABLES	Shipping cases.
VEGETABLES (FRESH)	Cellophane, Pliofilm, polyethylene, mesh bags, and shipping cases.
VINEGAR	Shipping cases.

use of critical materials to a base-period amount. Now the tinplate container order, M-25, restricts quantities of metal containers for some end-use products. Future cutback orders will slice the use of tinplate for metal containers still further.

While conditions now confronting the food packagers do not look too promising, it is to be remembered that the industry passed through a more critical situation within the past decade. And while the going was rugged during those periods of subsidies, price controls, rationing, and shortages, the food industry weathered the storm and emerged better prepared for the change-over from war to civilian production.

Now, as an aid to food processors confronted with packaging problems arising from restrictions and shortages, FOOD ENGINEERING has gathered pertinent information on eight significant factors:

1. Packaging materials and equipment reported in short supply by food processors.
2. Substitutes that food processors reveal they may be forced to use in the coming year.
3. Measures now being taken by food packagers to overcome present shortages.
4. Suggested conservation measures.
5. The outlook for important packaging materials and containers, as well as a summation of current restrictive measures.
6. Shortages of the more important chemicals used in the manufacture of containers and packages.
7. Possible substitutes for those materials normally used, with a review of World War II packaging changes.
8. Physical properties to be considered when switching to substitutes.

Critical Supply Situation Calls for All-Out Effort

As stated, food processors are now slowly approaching a period in which they are finding some packaging materials difficult to obtain. For the first time since 1946, supply and demand for such essential packaging materials are out of balance.

This condition is attributed to the 1949 slow-down in the economy; the Korean conflict; and the subsequent sudden tightening of raw materials needed by container manufacturers and converters to produce packages. And it exists

despite expansion programs designed to step up the production of basic materials like aluminum, cellophane, plastic films, paper, paperboard, and steelplate.

In view of these difficulties, FOOD ENGINEERING, with the helpful cooperation of many food plants throughout the country, undertook a survey principally to learn four things: (1) What materials, containers, and equipment are now difficult to obtain for packaging a variety of food products; (2) steps these companies are now taking to meet current or anticipated shortages; (3) substitutes that may be necessary within the coming year; and (4) changes these firms were forced to make in the use of packaging materials and equipment due to World War II shortages and restrictions.

Supplies Difficult to Get

True, the requirements of the food industry for containers and packages have not been fully satisfied, and packaging operations are becoming increasingly difficult to carry out.

But food packagers have currently overcome these problems without undue hardships. Though much to their dislike, they have, in some instances, shifted to substitutes. And most of the companies are even planning to increase the re-use of textile and multi-wall paper bags, metal and fiber drums, and shipping cases.

According to information on availability of packaging materials (collated in Table I), the majority of food manufacturers report difficulties in obtaining solid and corrugated shipping cases. Most firms are also having a tough time getting set-up and folding cartons. Considerable difficulty in filling their requirements for cellophane and aluminum foil was revealed by most users.

Some plants are not getting enough glassine. In some cases, sulfite papers are hard to get. Prepackagers of fresh meats and produce encounter difficulty in procuring plastic films. Canners of perishables find enough tin cans available, but some firms find a shortage of metal containers for certain non-perishables.

On the brighter side, most packers are receiving enough glass containers. Only exceptions are a few who are putting up baby foods, prepared mustard, and syrups.

On the whole, there does not appear to be any truly serious difficulty because of the lack of containers and packages. Materials are still available, although in most cases they are not always the ones normally used or desired.

Machines Come Through

The survey, significantly enough, shows no grave bottlenecks in the procurement of packaging machines. While the situation is reported tight, this equipment is coming through to processors—with delays, however, in some instances.

Meeting Shortages

Let us relate what some of the food processors are now doing to meet shortages:

Ways You Can Conserve

Suggested by Processors Surveyed by FE (see text)

■ **Re-use containers as much as possible.** Adopt methods of getting maximum re-use of shipping cases, textile and multi-wall paper bags, metal and fiber drums, barrels, and wooden boxes. Employ spot, strip, or tape sealing technics on your covers so that they can be opened without damaging, knocked down, returned, and re-used. Also, keep re-usable bottles in circulation.

■ **Adopt adequate and effective salvage measures.** To aid container manufacturers now short of paper pulp, segregate all kraft paper waste, fiberboard shipping cases, and brown paper bags and wrappers from other miscellaneous papers, and give them to a waste-paper dealer.

■ **Avoid overpackaging.** Where need be, use only the minimum practical amount of paperboard by economical redesign of your folding cartons and shipping cases.

■ **Use largest sizes practical.** Pack foods in the largest possible size metal or glass containers, cartons, shipping cases, or bags. For instance double the number of unit packages in shipping cases. Go from 6 to 12, 12 to 24, or 24 to 48 unit packages per case.

■ **Install bulk handling and storing facilities.** Cutdowns and even elimination of use of 100-lb. textile and multi-wall paper bags has been attained by bulk shipments of granulated sugar, liquid sugar, flour, and semolina. Shipment of such materials in trucks or railroad cars has been standard practice for some refiners and mills for some time—particularly where short hauls to users with adequate handling and storing facilities make it economically feasible.

■ **Redesign packages to use less critical material.** Steer clear of the double overwrap, if product is adequately protected. Substitute windowless for window-type cartons, cellophane-window for all-cellophane bags, mesh-window for all mesh bags, multi-wall paper bags for wire-bound boxes, and glass for metal containers.

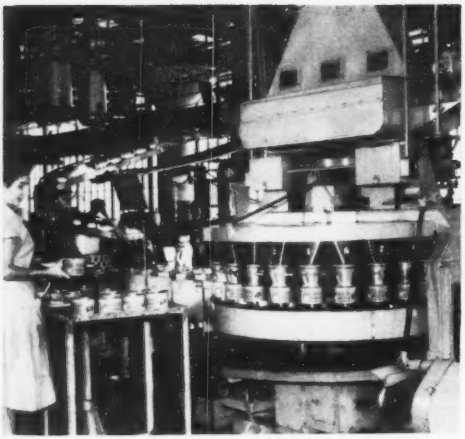
■ **Substitute alternate materials.** Wherever possible, switch from critical to less critical materials and always consider various alternates. If substitute package does not provide the desired protection, weigh the possibilities of shortening the shelf-life of the product.

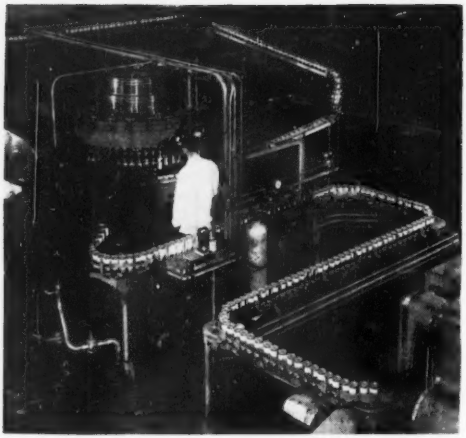
■ **Store packaging supplies under proper conditions.** Excessive moisture will damage cartons and shipping cases. Don't overstock on cellophane and similar films, for they are apt to deteriorate and lose moistureproofness. Too much sunlight causes packages to dry out and lose strength.

■ **Maintain packaging machines in good working order.** Considerable loss in packaging materials occurs when machines that fill, cap, label, and wrap are not functioning properly. Over- and under-weight packages necessitate re-packaging, causing loss in packaging materials and containers. Jam-ups on wrapping machines result in loss of critical transparent and other materials. Eliminate rewraps by keeping cutoff knife sharp and properly adjusted; clean sealing plates; use automatic retractors that prevent sealing plates from remaining in contact with the package when the machine stops; prevent telescoping of film, especially if narrow widths are used; insure close control of film tension and slack take-up to keep machine running smoothly; and replace worn feed rolls.

■ **Check operation of conveyors.** Eliminate bump-damage hazards to cartons and shipping cases by remedying sharp edges and corners on belts, by checking guards and transfer points, and the like, and by measures to reduce jam-up factors.

■ **Palletize cases.** By adopting the fork-lift truck and pallet system, considerable damage to shipping cases can be eliminated.





RECENT tin orders indicate that NPA will handle restriction of food packaging materials cautiously. Order M-25 forbids use of tinplated cans for coffee (left), along with other non-perishable foods. Fixed at 90 percent of base-period's production are tin cans for beer (right). Quotas for perishable foods are unlimited. Photos courtesy General Foods Corp. and Blatz Brewing Co.

A baby-food packer is switching from glassine to waxed paper, which he is also experiencing difficulty getting. He is also redesigning his shipping cases in order to use less paperboard and to pack more units per case.

Some bakers plan to cut down on the variety of items produced, simplify packages, contract ahead, step up all possible reclamation, and substitute transparent glassine and sulfite wrappers for cellophane. A pie baker is turning from cardboard to returnable metal or plastic trays. And a pretzel firm has even set up a special foreman's training program to conserve materials.

Brewers are gradually switching from cans to glass. One is placing orders six months in advance to assure deliveries. Practically all candy manufacturers contacted are placing long-range orders and carrying out tests on substitutes—waxed paper or glassine to replace foil, or a glassine laminated bond paper for wax-backed foil. One candy maker is using larger containers.

A macaroni manufacturer is going to limit his varieties. Meat packers are making substitutions with less critical materials and ordering well in advance. One is redesigning his present packages for savings.

Some sugar refineries have enough bulk storage bins to hold them over for some time, and they are also making installations in food plants to enable them to deliver in bulk. Coffee plants are planning to adopt glass.

Users of packaging materials can aid themselves as well as the government by carrying out the four-way plan recently cited by R. de S. Couch, of General Foods Corp.:

1. Determine type and quantity of packaging materials used.

2. List type and quantity of packaging materials by product, along with reasons why they are required for that item.

3. Also tabulate substitute materials that can be used without sacrificing protection or merchandising features.

4. And be prepared to present the story to the government.

Anticipated Substitutions

A prime question asked food processors in the survey was: What substitutions in your packaging materials or containers do you anticipate may be necessary within the next year?

Here's a summary of the answers submitted by packers:

Canners of fruits and vegetables don't expect many changes. But, one packer believes he may have to pack some fruit in glass instead of tin containers.

Most users of cellophane believe they'll have to switch to some extent to other transparent films. Brewers may have to substitute beer bottles for cans, and wooden cases for fiber ones. Several bakers feel they may have to use cheaper and less attractive packages. Candy makers may have to replace aluminum foil with another wrapper, switch from tin to glass containers, and use less expensive and thinner cartons.

Some firms packing certain non-heat processed items in glass feel that blackplate may replace tinplate caps. Meat packers report that they may have to find substitutes for cellophane and other plastic films, and they may have to use less attractive cartons.

Prepackagers of fresh produce are fairly certain of three changes—use of kraft paper bags with cellophane windows instead of cellophane bags, kraft paper bags with mesh windows in place of mesh bags, and multi-wall paper bags for wire-bound wooden boxes.

Most food processors believe that shipping cases will be redesigned to conserve material.

Packaging Supply Situation Becoming Tighter

Chief concern of the food packer is what will happen to packaging materials and equipment in the near future. No supplier of packaging materials or no equipment manufacturer has stopped production at present. However, food processors have already altered their planning in the face of difficulties in obtaining certain materials. And foresighted processors have already modified their packaging lines to handle substitute packaging materials—particularly glass.

Deliveries on standard machines are short. And it behooves food processors to check their equipment and replace worn parts before the situation becomes critical.

Intensification of effort and shifts in containers, especially economy on tin, are required. In addition, simplifi-

cation and economy in wrapping foods may be necessary.

Bottleneck that is being thrust upon the food industry today arises from the shortages of various materials normally used to package foods. Aluminum foil can no longer be used for labels. The first cut-back order on tin has already been issued. Rubber, of increasing importance to food packers using rubber hydrochloride film and sealing rings for closures, is already restricted. Burlap bags are short in supply because of a severe lack in jute products. Also, supply of various other packaging materials, such as cellophane, paper, and cotton bags is tight.

According to the Department of Commerce, demand for packaging materials is at an all time high. This is attributable, in part, to increased business brought about by inflationary conditions arising from the Korean War. But most of this big demand is seen caused by packers' stocking of materials. A factor here has been the step-up after the 1949 business slow down. During that period, food processors cut their inventory on packaging materials to below normal levels.

To summarize: With some packaging materials already in short supply, and with increasing production of military items and subsequent tightening of raw materials used for wrappers and containers, the situation is almost certain to become even worse.

Consequently, it is likely that there will be some disruption of packaging operations, which will necessitate shifts to alternate packaging materials, increased re-use of containers and bags, and efforts to get maximum use out of less packaging material.

Use of Tin Curbed

Mildest of cutbacks is the present tin order, which NPA bit into lightly. Main objective of the latest NPA orders limiting the use of tin for canning and other purposes was to save 20 percent of that metal, or 5,400 tons.

Order M-25 prohibits the use of tin for plating cans for coffee, cocoa, lard, peanut butter, shortening, tea, yeast, spices, fruit cakes, bakery products, baking powder, malted milk, dry milk, baking mixes, candy, dessert powders, bouillon cubes, and other non-perishable items. These may, however, be packed in blackplate—steel not coated with tin. But the blackplate-supply situation is confused. Bonderizing units used during World War II have gone out of operation.

In general, M-25 fixes the weight of tin coating for 347 items, sets standards at the lowest practical weights, and in some cases allowing tin only for soldering seams. The order requires canners to limit their use of tinplate and terneplate in packing a long list of products. In packing beer, the brewer is allowed only 90 percent of his average for the first half of 1950.

For other perishable foods, the order permits either 100 percent of that base period or an unlimited amount. The 100 percent limit (100 percent of tinplate used in the corresponding quarter of 1949 or 1950) applies to items such as prepared meats, prunes, cider, broccoli, Brussel sprouts, dairy products, and a limited amount of seafoods. Most of the highly perishable fruits, seafoods, juices, and vegetables get unlimited amounts.

NPA officials noted that, even where a cut in the use of tinplate and terneplate is prescribed, the canner can actually pack as much or more than he did in the 1950-base period. He can do this by using larger cans that hold more for a given amount of metal. M-25 places no restrictions on the sizes and shapes of containers.

Biggest reduction in tin was from 0.50 to 0.25 lb. per base box. For highly corrosive foods such as sour cherries, there was no reduction in the 1.50 lb. weight of tin coating used.

Although tests indicate otherwise, a number of canners are concerned about exterior corrosion of 0.25 lb. plate. Many canners will want double-lacquered ends, and the QMC may want its cans precoated or procoated.

Inasmuch as the order is only the first step in tin conservation, canners anticipate that another regulation soon will change the present picture.

It is possible that there will be greater limitations in the use of cans for beer and dog food—or even the complete elimination of tin cans for such products.

There are strong hints that the next cutback will effect a further 10 percent saving of tin.

Order M-26 applies to bottle caps, jar lids, and other closures. It restricts the thickness of the tin or terneplate, allowing the thickest for sealing most foods and the thinnest for malt beverages, soft drinks, and diluted fruit and vegetable juices.

The closure order is not drastic. No quotas are set, and no packs are cut off from their usual closure.

Many packers anticipated the tin orders, hence began looking to glass. This is confirmed by glass-container manufacturers, who report a huge order backlog.

Tin Rules Changed

Soon after the first tin-can rules were adopted by NPA, fundamental difficulties developed. Recognizing these, NPA did issue an amended form of M-25 late in February. Thus, the packing of certain food products in all-tin or part-tin containers became feasible.

Many minor changes were provided, such as the permission that sifter tops of spice cans might be tin-coated, since enameled or lacquered blackplate proved unsatisfactory for the sifter slides.

More important, recognition of food technology came in new permission for tin cans to be used for numerous additional commodities, including: Frozen and processed orangeade-base concentrate, frozen pineapple-juice concentrate, hams packed in various types of cans, beef and other gravies, and spaghetti and meat balls.

These modifications of M-25 do not mean, however, that the order will not soon be made more severe.

Tinless Tin Cans

A recently announced American Can Co. project bears promise of easing the picture as regards containers designed for certain nonperishables. Success of the plan would help free this country from dependence on foreign can-making materials—tin from trouble-torn Malaya and other materials, now imported, for the making of organic plate coatings.

The project was specifically undertaken in anticipation of the lessened availability of tin—to make possible commercial production of cans for products that have been, or may subsequently be, denied use of tin-coated steel.

One of the biggest problems in such production has concerned the soldering of the side seams of cans.

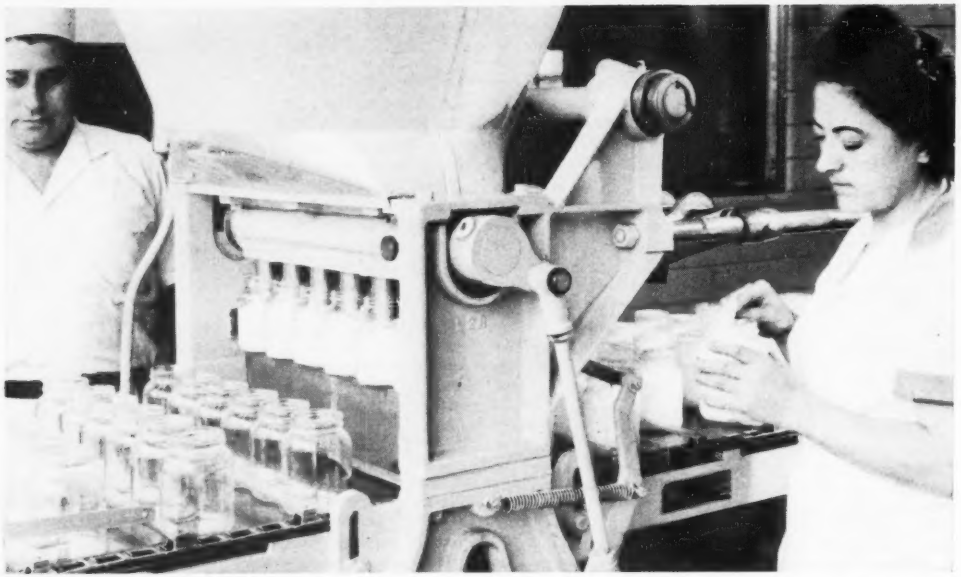
Briefly, pilot-line operations have been set up in which cans are made of tinless steel and seamed with low tin-bearing solder—with production at speeds comparable to that at which tinplate cans roll off the lines.

Also being tested is a special plastic cement to replace solder for the side-seam job.

In the new can process, an organic coating, of domestic manufacture, substitutes for tin in protecting the steel base and the contents packed in the cans. These cans will be adaptable for packing a wide variety of dry products, such as cocoa, coffee, and baking powder. They can also be used for shortening. They are not suitable for beer.

Glass Container Outlook

Need for glass containers, created by the outbreak of hostilities and the shift from tin cans, is taxing productive capacity, and future civilian requirements might cause a squeeze on jars, bottles, and closures.



IMPLICATION of the recent tin order is that food processors had better get plans underway for using substitute packaging materials. Already, some packers are looking to glass containers and getting glass-handling equipment on order. Photo courtesy Durkee-Mower Co.

Impact of this increased demand came at a peak in glass-container production. Most of this demand simply added to the backlog of unfilled orders. Under such conditions, some glass container manufacturers may be reluctant to serve new customers, especially those whom they feel will revert to metal containers when these are again available.

According to the Department of Commerce, members of the Glass Containers Manufacturers Industry Advisory Committee informed the NPA that lack of basic materials, such as cullet (crushed glass), soda ash, and cobalt, is retarding an increase in production of jars and bottles. Also there is the shortage of paper for cartons beginning to be felt by the industry, and here committee members fear still greater pressure. Industry representatives were likewise concerned with future fuel oil supplies for their plants, and they added that they were experiencing difficulty getting glass decolorizers.

It is estimated that more than 104 million gross containers of all types were produced in 1950. And that production may increase about 35 percent to 141 million gross units in 1951 to keep pace with demand.

Thatcher Glass Manufacturing Co. is constructing a new plant at Lawrenceburg, Ind. And several idle furnaces will begin operating. All furnaces are running 24 hr. a day, and 7 days a week.

The glass-container mold problem may get serious, especially after some of the mold shops get into defense production. And the industry may be confronted with the same situation experienced in the last war—use of standard stock molds. However, it will be recalled that by employing standard molds, production was materially increased and considerable savings were attained in manhours, raw materials (soda ash, sand, and lime), fiberboard shipping cases, and mold-iron.

In general, the glass container industry is in a fair position to come through in upping production over 25 percent this year. The industry was operating at 86 percent of its capacity at the start of the last war, yet it extended the use of glass to formerly tinpacked coffee, shortenings, syrups, honey, baked beans, and vegetables.

Manufacturers of glass containers are reportedly experimenting with lightweight glass of the same strength as the present materials to reduce production costs and permit competition with metal and paperboard containers.

Trouble in getting metal closures is reported affecting the switch to glass containers.

First food packaging material hit by an NPA order was aluminum. But, the recently amended aluminum cut-back order, M-7, only restricted the food industry's use of the metal for foil labels applied to various containers. For overwraps, foil film can be used—as on cheeses, candies, and folding cartons.

Not Enough Cellophane

Cellophane is critically scarce. Granted, the food industry is promised increased production, but processors are warned not to base plans on that promise. There won't be a sizable up in output until after September, when the new 8-machine Olin Industries plant at Pisgah Forest, N. C., will begin operations.

Du Pont says the shortage is due to the rise in sales of most products packaged with cellophane, while production of the film stayed about the same. As a result, many companies have curtailed or actually discontinued packaging some of their products in cellophane, turning meantime to other suitable and more available films. All du Pont and Sylvania customers have been placed on allocation to assure them a fair share of cellophane.

The produce industry is shelving plans to extend the prepackaging of items like celery and lettuce. Prepackaging of fresh meats and sliced luncheon meats has been hit hard because retailers have not found enough cellophane and Pliofilm. Although many concerns in the candy industry have been able to obtain sufficient cellophane for current needs, difficulty in doing so is considered a strong indication that real shortages for them are not far off.

The present restricted supply of other transparent films has been further aggravated by military demands. Pliofilm has already been short, and limitations on the use of natural rubber will materially affect production of this rubber hydrochloride film.

Polyethylene film may have to be discounted for food packaging, since there are many military calls for this plastic. Saran film will find increasing uses as other materials become less available. Food packagers will be forced to scramble for glassine, vegetable parchment, and waxed-paper wrappers.

Faced by a slim raw material supply, paper mills are searching for more waste paper in order to meet government and civilian requirements. Need for using waste paper to stretch available supplies in the manufacture of shipping cases and fiber drums was highlighted by an industry-NPA meeting. Outcome was NPA instructions to the industry group to re-use, wherever possible, fiber drums and shipping cases.

Greater need for pulp products will be somewhat alleviated when the big dissolving-pulp mill of Columbia Cellulose Co., Ltd., at Prince Ruppert, B. C., starts production. Initial output—70,000 tons annually— will be equivalent to a 20 percent increase in North American supplies of cellulose.

Demand for solid and corrugated containers exceeds supply, despite the fact that most manufacturers are working a 7-day week. Producers of corrugated containers find pulp wood and waste papers hard to get. They are also encountering growing difficulty in obtaining resin adhesives.

With substantial backlogs of orders, most container manufacturers see future production and shipments depending primarily upon availability of raw materials. Some manufacturers who have reached capacity operations, are considering expanding plant capacity.

Need for heavier tonnage of paper will arise as the government jumps its requirements for "V" and "W" containers. And a revision of World War II paper-box specifications is likely. Food processors seeking paper cartons for non-defense needs would be wise in scheduling their orders as far in advance as possible. But they shouldn't expect shipments within four months.

Shortage of paperboard is limiting production of folding and set-up cartons. Again, the pressure is on raw materials in the face of increasing orders for these cartons.

There is a steady call for kraft and multi-wall paper bags, with some suppliers as much as three months behind in deliveries. There is a trend to use kraft instead of cotton bags, and multi-wall crepe bags in place of the regular multi-walls.

Heavy demand for cotton bags is reportedly due to the burlap shortage. Some users are putting their bags on a returnable basis instead of selling them. Indicated is a dwindling supply of used bags.

Regarding the cut in production of burlap bags, which are made of jute, the Department of Commerce quarterly report, *Containers and Packaging*, states that it is the difficulty of obtaining allocations of jute from India that has resulted in the dearth of burlap in this country. Moreover, burlap inventories have been decidedly depleted, and the outlook for the immediate future is uncertain. On the brighter side, Mr. W. D. McLean of Bemis Bro. Bag Co., announces that after participating with authorities in Calcutta, a new Indian burlap allocation system may result in increased supplies for this country during 1951.

Potential supplies of polyvinyl alcohol and acetate—used for resin-type adhesives—are getting smaller. However, there is enough of the non-resin adhesives to keep food packagers going. Any additional material shortage may make it difficult for processors to maintain uninterrupted operations.

War Hits Major Chemicals Used for Food Packaging

RICHARD F. WARREN
Market Editor, "Chemical Engineering"

Food processing firms are finding that shortages in other industries have a nasty habit of suddenly showing up in their own at unexpected times. This has led to a special study of the chemicals used to make food packages—a study showing why some packages are now scarce and why others will get scarce.

Soda Ash Capacity Normal

Production of soda ash was not able to meet the demand last year. But this was not due to a lack of capacity. Strikes at major alkali plants cut off about 630,000 tons of this chemical from the market. Today, we have a capacity that is running almost 20 percent ahead of 1950 rates and a supply-demand pattern that is returning to normal.

Last year, about a quarter of the soda ash went into glass production. Biggest market for glass is in containers, and food processers take the lion's share of the output. While production of all glass containers is running about 2 billion units below peak World War II operations, output has doubled since 1939 and capacities are now almost 50 percent ahead of 1950. With present facilities, we should be able to get more than 21 billion units per year if real scarcities of metal containers develop.

A boost in glass containers of this magnitude can be met by the soda ash industry if other consuming markets do not get over-riding priorities. The real problem in the glass container industry in the coming months is getting enough closures to make this glass capacity effective. Here, the food producers are in a much better position than the other glass container customers. Today, both tin and terneplate have been authorized for metal closures used in hermetically sealed food containers.

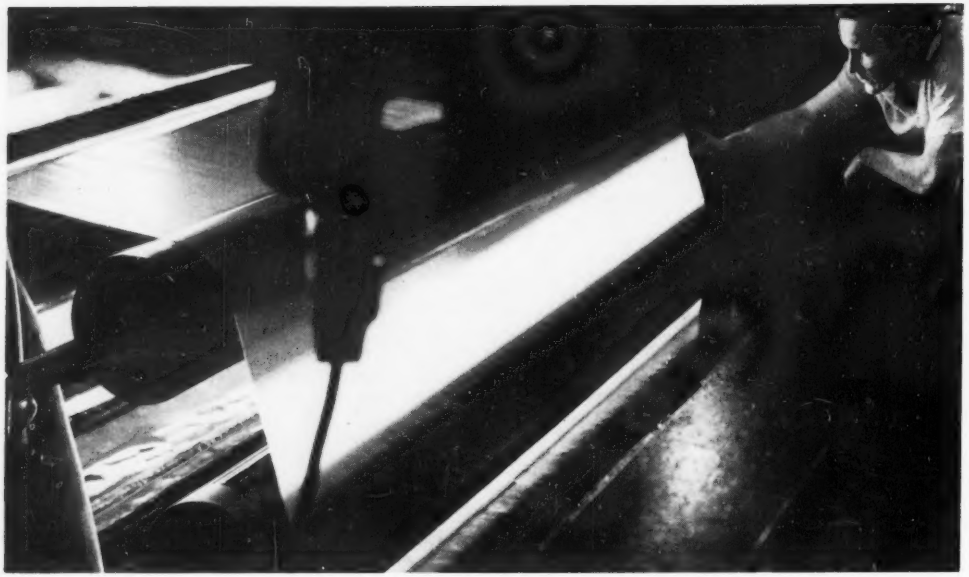
The allowable amount of tin coating per base box is lower on other food products, but it is permitted for a wide range of foods. Even before the arrival of controls, however, both metal and plastic closures were becoming hard to get. Reason for the current squeeze: During the first nine months of last year, shipments were running 35 percent ahead of the same 1939 period. Customers took over 10 billion units.

One big problem facing milk producers is getting sufficient aluminum milk-bottle closures. Some milk bottles require this type of closure. NPA Order M-7 restricts the use of aluminum by all consumers to 65 percent of the tonnage of this metal used during the first six months of 1950 (other base periods may be picked in special cases). However, appeal from the rules set forth in the order will be considered if they are in the interest of national defense or in the public interest. This order does not attempt to tell producers how they can dispose of the allocated share of aluminum.

Plastic closures will run low as a result of the rubber program's diversion of styrene from the plastics markets. Other resins such as polyethylene and vinyl polymers are helping to fill this gap. Of course, they, in turn, are thus diverted away from the other expanding markets.

Closures of many glass containers need rubber, supply of which is going to be drained as long as our stockpiling program continues. However, food packagers will be given a fair share of the rubber made available for civilian use. Certainly, no curtailment of food output will be forced by the rubber shortage.

Despite steady increases in production, cellophane has



CELLOPHANE is critically scarce, and manufacturers have placed customers on allocation to assure them a fair share.

never been ample for the food industry. Chief raw materials needed in its production are pulp, caustic soda, carbon bisulfide, and sulfuric acid. All of them are already in insufficient supply, though the defense load on these materials has not yet peaked.

As brought out earlier in this report, most food packagers have not been able to get enough cellophane in recent months. They will be forced to pursue the available supply in the future, although there is some relief in sight. Du Pont and Sylvania together make about 280,000,000 lb. per year. Olin Industries will bring in an estimated 33,000,000 lb. annual capacity next year. With expansions by other producers, capacities may pass the 325 million pounds per year in the next few years. There will be an ample market when it arrives, although availability of other films will of course be a factor.

No Future Polyethylene Surplus

Up from nowhere has come polyethylene film. Even in 1949, when most plastic materials were looking for markets, polyethylene was scarce. Last year, output of "poly" topped 60,000,000 lb. More than 24,000,000 lb. was used in film. And even more will be used for this purpose in 1951 and 1952—for employment of this material for bottles will probably be cut sharply.

Current plans call for expansion of "poly" capacities to 90-100,000,000 lb. per year. Much of this will help put the 30 percent additional film extruding capacity into operation. This is still some months away, but the new resin facilities will be more than enough to keep all existing polyethylene-film extruders running at top speed in the last quarter of this year.

One of the problems facing food packagers wanting polyethylene will be the demand for this plastic in military electrical and electronic equipment. Use of this film as layer in multiwall bags and coated kraft stock by the QMC will favor food processors working on military orders. All told, no surplus of "poly" is seen in the coming years.

The signal corps is making millions of miles of assault wire, requiring 14 lb. of polyethylene per mile. So it is easy to see that any near-future supply of polyethylene could be absorbed in the production of such wire.

Military Will Take Some Acetate

Last year's output of cellulose acetate film under 0.003-gage jumped up about 4-5 million pounds. This growth is primarily due to a new process that extrudes a flatter film that is easier to handle on wrapping machines. It is headed toward a big market in wrapping vegetables and meat. However, a large part of the 1951 output will be channeled into an ordnance wrap—a moisture-resistant barrier consisting of foil, film and wax. Here, too, chemical shortages may have some impact on expansion plans.

As in the case of cellophane, the pulp supply problem is worrying producers. But firms like Celanese (who had a big new pulp plant start up in March) are making every effort to supply all demands. Acetate rayon is competing with the film, extrusion, and molding industries for the supply of cellulose acetate flake—the building block for all cellulose acetate products.

Acetic anhydride production is the major chemical factor in the cellulose acetate flake output. About 95 percent of all acetic anhydride is used in making this product. Supply of this giant of the organic chemical industry should be sufficient to take care of essential food packaging needs in the coming months, but allocation may become a factor this year.

Greater Vinyl Film Output

Vinyl film output has climbed so rapidly that in 1950 output was more than four times the 1946 rate. Production of all vinyl sheeting and film reached 222,000,000 lb. last year. Film under 10-gage continued to claim the largest part of vinyl resin output.

Will the food industry be able to get more next year? To find the answer to that question calls for consideration of the plasticizer problem.

Plasticizers are the chemicals that are mixed with various plastics to permit the base resins to flow into the desired shapes and keep them flexible. These are broken down into

various types: Phthalates, phosphates, polyesters, adipates, sebacates and fatty acid types. In 1950, about 110 million pounds were consumed in the vinyl resin markets. All of these materials are fast returning to the critical lists.

However, in spite of all the stumbling blocks that the vinyl producers face, they think there will be enough of the pasticizers to boost production another 20 percent in 1951. This will mean a comparable increase in film output for food processers, unless the government requires a larger-than-expected bite for military purposes.

Adhesives in Good Supply

Manufacture of many cartons used by food producers involves the adhesives made from synthetic resins, starches and dextrines, as well as animal glues. Output of adhesives rose to an all time high of 400 million pounds in 1950, and there was still an excess capacity of 100 million pounds open for use.

But, late in 1950 there was some shortage of waterproof adhesives. About 30 percent of the adhesives are made from synthetic resins, such as phenol-formaldehyde, urea-formaldehyde, melamine-formaldehyde, and vinyl polymers. All of these products have encountered critical raw material hurdles.

Phenol-formaldehyde resins have continued to grow in spite of the acute drain on formaldehyde, now diverted to explosives output. Since the actual amounts needed for explosives production is not revealed, the exact status of the various resins involved is now in doubt. Of course there will still be plenty of formaldehyde-containing resins on the market, but very little growth can be expected until direct military needs are met.

In any event, any shortages that develop in this part of the adhesives output can be balanced with the potential growth of animal glues and, if necessary, some can be diverted from laminating resins and molding compounds. Idle formaldehyde capacity is currently being pulled out of mothballs and this increase in output, together with current expansions in benzene-producing units at petroleum refineries, may soon reduce and even eliminate the current pressure.

Urea and melamine resins will benefit from the recent additions to American Cyanamid's melamine capacity and the Allied Chemical & Dye Corp.'s entry into urea production. Last year, the turn-out of these resins jumped 45 percent over 1949 rates. While most urea is consumed in fertilizers, it seems likely that there will be no shortage for resins this year. Melamine is used in paper pulp required to make V-board and other types of wet strength paper used in the food industry.

Ink Supply Adequate

Food packages were responsible for a big part of the 10 percent rise in ink output last year. Odorless inks have felt the pinch caused by shortages of glycerine and other polyhydric alcohols. However, the ink industry has a reputation for skill in developing substitutes, and supply of ink for food packages is currently termed adequate to meet all reasonable needs. Some colors may become tight as more restrictions are placed on metals such as cobalt—base for some blue inks—to meet other defense needs.

Titanium dioxide pigment employed to give opacity and whiteness to paper used in food packages is also scarce due to a shortage of sulfuric acid needed in separating the pigment from the black ilmenite ore. This low-level of the acid is in turn created by the unprecedented acid demand in all consuming industries and the resulting dearth of sulfur needed to make the product.

Coming importance of titanium metal will also have a temporary adverse influence on the pigment supply to paper manufacturers.

Pulp and paper producers are watching the current chlorine and sulfur situation closely. Supplies of paper and board are tied to the availability of chemicals. This relationship has influenced many pulp makers to become chlorine and caustic producers. While supplies of chlorine are still extremely low, the current expansion program of producers will yield another 1,200 tons per day to our 6,000-ton-per-day capacity. This will go far toward easing the supply situation.

Regarding the lack of sulfur, the reduction of exports has *temporarily* balanced our demand-and-supply picture and the possibility of more reclamation of waste acid may permanently adjust the scales.

How Packaging Problems Were Met in Last War

What the food processors, suppliers of packaging materials, and equipment manufacturers did to surmount the seemingly hopeless situation during the last war should be helpful to the industry today in preparing to meet packaging problems arising from the national emergency.

Accordingly, FOOD ENGINEERING rounded up pertinent information on how companies substituted packaging materials for those scarce or unavailable "the last time."

Hundreds of substitutions and combination packages—primarily influenced by the relative availability of materials—were adopted simply through interchange of component parts of a package or container.

While tremendous pressure was brought to bear to conserve scarce and strategic materials, the processors also had to consider such important factors as: (1) Equipment required and its availability, (2) speed and amount of labor needed to package, (3) weight and size of package and its component parts, (4) appearance and shelf-life of product put up in a substitute package, and (5) cost in relation to price ceiling set up for product packaged.

Metal Containers: Tin conservation orders during the last hostilities hit a long list of foods. Entirely banned from tin were beer, coffee, cereals, flour, spices, condiments, dried beans, pork and beans, and baking powder. Canners were specifically directed by order to substitute, where feasible and practicable, containers made of other materials than tinplate; to concentrate upon larger size cans to the greatest extent practicable; and to use a minimum amount of solder with a minimum amount of tin for sealing cans.

Many canners were limited to a fraction of their annual pack. And can sizes were principally limited to Nos. 2, 2½, and 10.

In 1941, the can industry used 41,000 gross tons of tin to make 25 billion cans.

By 1950, the industry had reduced the tin content sufficiently to require only 31,000 tons to make 33 billion cans. But now the industry has just been cut another 20 percent from what is considered by present standards to be an almost irreducible minimum. From prewar usage of 1.43 lb. of tin per base box plate, the average coating weight has presently been cut to about 0.82 lb. per base box by use of the electrolytic plating process.

During the last war, better manufacturing facilities were installed to make tin cans. Continuous mills for rolling strip went to a base metal of lower phosphorous and silicon contents, with consequent better corrosion-resisting properties. Large electrolytic tinning lines supplemented hot-dip equipment, with the result that electrolytic plate was here to stay. And enamel-coated electrolytic plate was made superior in rust-resistance to standard plain hot-dip plate.

The hot-dip coating of 1.25 lb. was the minimum that could be safely used for many foods, and heavier tinning was employed for others. A 0.50-lb. electrolytic coating gave sufficient protection for many of the less corrosive

From Metal to Glass, Then to Paper

TYPICAL World War II alternates for metal containers: Some heat-processed foods, such as meats, went from tin to glass containers with vacuum closures. Beyond glass, there was no substitute for such products. Ground coffee switched from tin to a vacuum-sealed glass jar, then carton and paper bag. Tin-packed baking powder was first marketed in a chipboard container with blackplate ends and a friction cap, and then in an all-fiber lap-seam container with a reclosure top. In addition to glass jars, tin-packed peanuts and similar products were packed in paper.

foods. Chemically treated plate—bonderized and enameled—had limitations in resistance to corrosion and adaptibility to fabrication technics. World War II's M-81 required that electrolytic plate, or electrolytic ends with hot-dip bodies, be used wherever possible. It specified chemically treated plate ends with electrolytic can bodies for a few vegetables and some meat products.

Steel mills installed facilities to manufacture steel sheets coated with iron phosphate—the bonderizing process. There were four types of materials for rigid metal containers: (1) Tin-coated (hot-dipped), (2) tin-coated (electrolytic), (3) bonderized, and (4) black steel.

Use of bonderized steel in can-making represented the all-out effort in tin conservation, but it placed a great burden on can manufacture, since it involved the use of new manufacturing technics and much additional equipment. Bonderized plate was covered with one or two coats of enamel to eliminate under-film corrosion and to secure adequate adhesion of the organic coatings.

Blackplate (deoxidized) had a protective enamel applied to it to prevent rusting.

Most significant development, resulting in considerable tin savings, was coating by the electrolytic process. By virtue of the uniform application of tin attainable by this process, it was possible to obtain coatings as low as 0.1 lb. of the metal per base-box, as contrasted to the hot-dip process wherein the coatings, averaging less than 1.2 lb. per base-box (pot-yield basis), were usually unsatisfactory and difficult to apply.

First significant World War II change—the swing from tin to glass containers—affected fruits, vegetables, meats, vegetable shortenings, coffee, and cranberry sauce, which were originally packed in hermetically sealed tin containers. Also glass-packed were honey, baked beans, and dehydrated soups.

Products like cocoa in metal containers went into paperboard cartons with oval, friction-type tinplate caps set in the paperboard lid of the container. Later, blackplate caps replaced the tinplate caps. Finally, heavy fiberboard caps were used.

Coffee converted from tin to glass, paper bags, and cartons, was a familiar sight on grocery shelves. The all-fiber coffee container was designed to be filled on existing equipment with minor machinery adjustments. This container was protectively lined and fitted with two closures—a shipping disk which was removed by the consumer and a replaceable cap to close the lid.

When the pinch for metal was really felt, one of the country's largest coffee roasters developed a simple way to close bags. Eliminated was the paper-covered galvanized steel strip for tying down the closed top fold of the bag. Automatic machines were modified to fold tops of bags and crimp the paper to secure the fold.

Baking powder, formerly packed in tin, was marketed in a chipboard container with blackplate ends and a tin-plate friction cap which slipped over a rim around the opening of the blackplate top. Also used was an all-fiber lap-seam container with a reclosure top.

Meat packers faced with a shortage of metal pans for packing souse, scrapple, and a variety of loaf specialties used a substitute container—a leakproof paperboard loaf pan, specially treated to withstand high-temperature filling. Canned luncheon meats went into glass tumblers with a vacuum cap. Sliced roast beef with broth was put up by one firm in a heavy fiberboard container with a slip-over fiberboard top.

Crackers were packed in a spiral-wound, wax-treated cylindrical paper container, as a substitute for round cans. Cover was a slip-over type that fitted tightly, yet was easy to remove. It was also effective as a reclosure. A fluted glassine liner fitted loosely into the cover, and crackers were packed in fluted glassine cups.

Corrugated cookie boxes were designed to relieve shortages of critical materials—particularly the tin container. Such boxes were retained after the war by cookie manufacturers.

Dehydrated soups, formerly packed in cans and glass jars, went into paper-cup containers, fiberboard cartons, and bags (cellophane and foil-glassine). Dry soup mixes were shipped overseas in 5-lb. delta-seal kraft bags, which were placed in 450 MST cellophane bags that were then heat-sealed.

Tinplate shaker-type containers for spices and grated cheese were replaced by fiber containers, with fiber or blackplate ends. Lard and shortening went from metal to paper containers with greaseproof liners. One firm put lard in a chipboard container, cellophane-laminated on the inside and covered with printed cellophane on the outside. Metal was used only in the rim that held the cardboard lid. Cartons for these items were wax-coated. Shortening in 50-lb. squares was packed in corrugated fiberboard containers with parchment liners.

For packaging dry products, there was a shift from tin-coated to tinless steel, bare or enameled. And products once packed only in tin also found their way into paperboard containers—some heavily waxed.

Glass Containers: Glass-packing came a long way during the last war. Glass containers were made lighter and stronger. For example, the prewar multi-trip beer bottle weighed 16 oz., while the one-tripper weighed only 6¼ oz. Jars for coffee, baby foods, and vegetables were reduced to about one-half the former weight. Even the square milk bottle, redesigned for convenience, came down from 22 to 17¾ oz.

There came use of larger sizes of glass containers, made in a few standard sizes and shapes, and with less weight of glass. And there was a significant output of them to take care of a large part of the foods that formerly were tin-packed.

To boost capacity for making glass containers and to economize on the use of materials in them, WPB designated 28 types and sizes of bottles, jars, and jugs as standard containers. Glass containers were standardized to a few plain, round, thin-walled shapes.

Use of glass for processed foods, however, was limited by the ability of processors to pack in glass, without new equipment. The scarcity of closures also presented a problem, despite the marked savings in closure metal attributed to standardization of containers under World War II limitation order L-103.

Glass was saved in the packing of many products that used it—jams, jellies, pickles, peanut butter, and dressings—by the elimination of a wide variety of the jar, bottle, and tumbler shapes.

Tin-packed honey, syrup, and molasses went into smaller glass containers. And many products such as pork and beans, spaghetti, corned beef hash, and similar foods for which tin cans were withheld by government order, appeared in glass. Later on, when closures became scarce, some of these foods were put up in paper containers and frozen. Some jellies were hot-filled into a duplex cellophane bag that served as an inner liner for 275-test corrugated kraft carton.

Stoneware crocks were used for cheese, syrups, jams, jellies, and even meats.

Caps and Closures: Particularly hard-hit by shortages and restrictions were caps and closures made of tinplate, aluminum, or plastics. Caps and liners also used other materials that were scarce or restricted—cork, foil, or both. Also there were the sealing rings of rubber or rubber composition.

Closures and caps were soon made of other materials. Substitutes consisted of lacquered or enameled black iron closure bodies, with specially treated paper liners and substitute composition gaskets. Aluminum was "out" for milk-bottle caps and hoods, but paper was available.

A two-part semi-plastic cap replaced some of the metal ones. This two-part closure, which used a small amount of Bakelite, was made of an annular plastic retaining ring that held a heavy paperboard liner to the mouth of the glass container. It was made in the same screw type for containers with a CT finish, in the snap-on type for containers with a bead finish, and in the slip-on or friction-fit type for containers with a plain tapered finish.

Rubber gaskets were permitted for a number of products by M-104. Flowed-in synthetic gaskets, held in by the design of the closures, were used to some extent. One company solved the latex-ring stumbling block with a heavily waxed paper disk glued to the top of the paper cap used on coffee jars. Ceramic caps were also used by some firms.

Cork in bottle closures other than crown corks had been

Watch Your Substitutes

Factors to Check When Making a Switch

■ **Moisture Vapor Permeability:** Dry products—particularly hygroscopic ones like soluble coffee, brown sugar, milk and bouillon powders, and dried eggs will pick up moisture and then begin to cake if the moisture-resistance of the substitute package is poor. Flours and prepared baking mixes will become moldy. Breakfast cereals will lose their crispness, and baking powders their gas-producing properties.

On the other hand, moist products like marshmallows or marshmallow-topped cakes or cookies will lose their moisture, and then become gummy and hard. Cheeses will dry up and also harden. Certain candies will become sugary and brittle. Brown-'n-Serve rolls will lose moisture and become hard.

■ **Gas Permeability:** Films for prepackaging fresh produce must be moisture-vaporproof. But they should not be effective oxygen barriers, since it is desired to retain the moisture of the vegetables inside the package and at the same time to permit them to breathe. These films can also be used for packaging freshly ground coffee, because they will allow carbon dioxide gas (which is generated over a period of several days) to diffuse through the walls of the bags and therefore prevent them from bursting.

■ **Organic-Vapor Transmission:** For dessert mixes like ice cream, sherbet, flavored gelatin, and pudding, substitute materials must resist transmission of volatile essential oils (flavoring constituents).

■ **Grease-Proofness:** When turning from your regular grease-resistant materials to substitutes, make sure the replacements don't permit fats and oils to penetrate. In the case of oleo, lard, butter, shortbreads, nuts, and certain prepared baking mixes, fats will penetrate liners having poor grease resistance and be absorbed by cartons. And this condition not only results in an unsightly package, but also accelerates development of rancidity.

■ **Odor:** Food processors must be careful they do not select substitutes containing objectionable odors that might be picked up by food products. For instance, if odorless, microcrystalline waxes should become unavailable, you might well consider substitution of resin blends as coating or laminating agents—but be sure to watch for foreign odors.

■ **Light:** Certain products, especially those with an appreciable amount of fat like potato chips, will become rancid more rapidly when they are packaged in transparent rather than opaque bags or wrappers. Reason: Oxidation of fats is accelerated in the presence of light.

■ **Physical Strength:** Make certain that substitute folding or set-up cartons and bags will resist bursting—otherwise, crisp bakery products, hard candies, macaroni and noodles, or the like, will puncture them during rough handling.

almost entirely replaced by cardboard faced with suitable plastic material—particularly plasticized vinyl resin calendered on paper. A bottle-cap liner made of plastic wax was used in place of those made of metal foil and rubber hydrochloride that had been employed for cold-packed products. The plastic wax liner consisted of white pulpboard heavily coated with a high melting, nonsaponifiable plastic type of wax.

Old tin and blackplate crowns were reformed, provided with new cork liners, sterilized, dried, and repainted. And the aluminum pouring spout on salt containers was replaced by a paperboard one.

Non-Metal Closures: Paper closures were available. A thermoplastic, moisture-vapor-proof coating was employed to seal and protect paper caps. A laminated cellophane cap was sealed to a container by means of a thermoplastic material. A milk bottle cap was made of laminated cellophane, with added stiffness provided by an inset disk. This cap was also used on coffee jars and bottles of still beverages.

Two manufacturers made impregnated, threaded paper caps (63-mm. size) that were handled on regular screw-capping machines.

Metal and Paper Containers: Cylindrical or rectangular paper-body containers with metal ends—black-iron coated or steel sheets in place of former tinplate—were employed for cereals, cocoa, tea, spices, flour, popcorn, baking powder, and dehydrated soups.

Paper Containers: Products put up in paper containers included those formerly packed in tin or glass that did not require heat-sterilizing or hermetic sealing. Dry products like tea, spices, cocoa, baking powder, and cereals fell in this class. Other types of products in this category were glass-packed jams, jellies, honey, syrups, cheese, dried beef, biscuits, shortenings, and various meat and fish products. There was greater use of liquid-tight paper containers in the distribution of milk in order to make more glass available for other necessary purposes.

Folding Cartons: Food processors who formerly used all types of packages—from tin and glass containers to foil wrappers—went over to lined or unlined folding cartons. But the biggest problem that faced the processors was the difficulty of getting suitable liners, like Pliofilm or moistureproof cellophane. Soon, suitable substitute liners came up—new laminated sheets, as well as treated glassines and vegetable parchments.

Formerly foil-wrapped, tea went into glued-end folding cartons made of clay-coated cardboard. In some cases, heat-sealable, moistureproof and grease-proof bags inside of folding cartons took the place of cans for moist or fat-containing products. And heavy paperboard cartons replaced wooden boxes into which cellophane-wrapped cheese was packed—six 3-oz. packages.

Paper Bags: Many packers were forced to use paper bags in place of former materials. Most outstanding substitute of this nature was the replacement of burlap and other fabric bags for bulk items like flour, sugar, and potatoes by either multiwall or laminated, specially treated kraft ones. In some cases, multiwall bags were used for shipping cases, due to restrictions on fiberboard and wooden shipping units.

Multiwall construction—3 to 7 layers of heavy kraft paper—made it possible to use sheets with special properties. The bags consisted of a wet-strength or greaseproof inner wall next to the product, intermediate sheets of asphalt or other impregnated kraft paper, and outer layers that withstood scuffing and abrasion. Sewed with sealing tape, these bags were siftproof. Lard, shortenings, peeled potatoes, sugar, flour, dried eggs, rice, salt, and dried skim milk were among the products packed in these bags.

Small bags for coffee, sugar, flour, and other dry foods found extended use. Processors of dry foods packed in bulk, with consumer distribution from retail stores in small bags. The size of paper bags was also standardized to conserve materials.

Some of the significant bags used were: (1) Semi-transparent greaseproof, wet-strength glassine; (2) water and vapor-resistant wax paper; (3) high wet-strength and grease-resistant vegetable parchment; (4) greaseproof and moisture-vapor-proof cellophane and cellulose acetate.

Kraft paper and boxboard, with strong surface layers or liners, were constructed to provide rigidity. Kraft paper was also built with high wet-strength properties, and it was also sized or glazed to provide various surface characteristics.

Many of these materials were laminated to one another with suitable adhesives. And each of these, laminated sheets contributed its special physical properties. Wax-coated cellophane bags were used for cheese.

Wrappers: Significant developments in wrapping materials came out of the last war. Modified wax coatings for papers were tougher. Lacquer and specially coated papers were also widely used. Interesting new paper uses arose from combinations of paper with synthetic films or foils.

Some candy manufacturers substituted waxed paper for foil wrappers. Others used a laminated waxed paper and printed glassine sheet for candy bars. Cellophane and cellulose acetate were used to wrap fruits, frozen fish, and other frozen foods. Specially treated cellophane, as a replacement for foil wrappers, was employed for ready-to-bake biscuits. Cellophane bags found wider use in candy packaging. Glassine and wax paper wrappers went mostly to the food industry as substitutes for other protective wrappers.

A transparent, heat-sealable cellophane film replaced a foil wrap used for cream cheese. Special wax-coated cellophane took the place of the rubber-hydrochloride base and foil wraps for ½-, 2-, and 5-lb. process cheese, which was then packed in a paperboard carton with an overwrap.

Frozen meats were, in some cases, protected by dip-coating them in lard, when efficient wrapping materials were not available in adequate amounts.

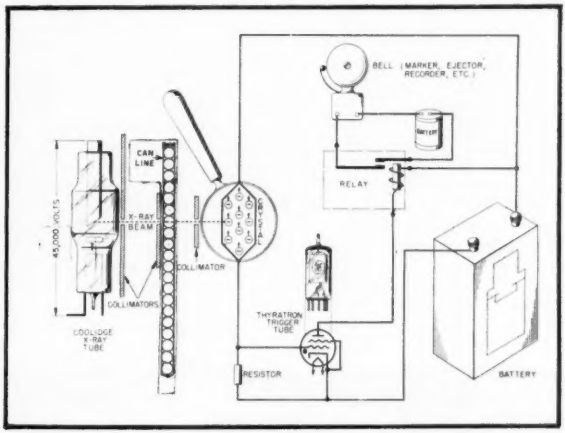
Shipping Cases: Corrugated shipping cases replaced some of the fiberboard ones. Wooden shipping cases and multiwall bags were called into service. In many instances, changes in Rule 41 of the consolidated freight classification made possible the use of lighter weights in manufacturing solid fiber and corrugated cases. Dairies went back to wooden cases in place of metal ones. Some bakeries substituted returnable wooden crates for fiber cases.

With the supply of fiberboard tight due to increased allotments to the military, considerable amount of material was saved by getting more service out of cases. Fiberboard savings were attained after packers were instructed to:

1. Place stickers or labels on cases to illustrate proper way of opening them.
2. Use gummed tape, when available, to seal cases, or to spot-seal, if done by hand. (Non-tear adhesives were preferred. Strapping was also used to avoid glue sealing.)
3. Insert labels or stickers inside cases to notify opener where to return cartons.
4. Employ packers' trucks to pick up cases.
5. Re-use cartons other than packer's own.
6. Reduce printed areas on cases to facilitate further use.
7. Avoid using staples.
8. Redesign cases for most economical use of material.
9. Employ lighter material, if possible.
10. Ship in larger size units.
11. Avoid overpurchasing and hoarding cases.
12. Make local shipments without shipping case, wherever possible.
13. Substitute corrugated for fiberboard material.

NEW EQUIPMENT & SUPPLIES

Fast check . . .



. . . and how "crystal-eye" does it

Device Inspects More Than 600 Cans per Minute

Higher speed and efficiency in inspection of many types of packaged foods is reported now possible with use of a revolutionary automatic X-ray system.

Pilot laboratory models have been built to inspect the product level in baby food, beer, soup and many other canned and packaged products.

The crystal-electric method promises to perform at unprecedented speeds, ranging as high as 600 units per min. in the case of canned foods and liquids. Laboratory model unit has operated at 640 cans/min.

Acting as a sort of industrial "slave eye", the crystals can solve many kinds of inspection problems, including: (1) Controlling and checking the product level in containers, (2) Detecting voids, cracks, cavitation and variation in material thickness in a wide variety of homogeneous materials, (3) checking for absence, misplacement or misalignment of inserts and other internal parts; and even eventually (4) spotting foreign particles in certain foods.

In the photo above, cans of baby food are shown being tested on a simulated production line in the Coolidge Research Laboratory, G. E. X-Ray Corp., using the new crystal detection technic. With Dr. John E. Jacobs, research engineer of the company (left), is Dr. Rudolph Frerichs, of the Northwestern University Physics Department, who collaborated on the development.

Heart of the apparatus is the barely-visible "nozzle" facing the cans from the left. Directly to the right of the cans is the low powered X-ray machine (45 kv. 3 ma.). On the table are a simple control box and relay, used to actuate any mechanism that will reject faulty cans. Dr. Jacobs holds in his hand a half-filled can, which has been spotted by the "crystal-eye."

Tiny Crystal Does the Job

The fundamental unit of the new inspection system is a tiny crystal of cadmium sulfide, known as a "semiconductor," which can be grown in cubic size from a fraction of a millimeter to several millimeters. When excited with X-radiation, it acts like an amplifier tube, releasing torrents of electrons that can be used to actuate various types of mechanisms.

The crystals amplify the energy they receive a million times. On an area-for-area basis, they are over a million and a half times more sensitive to X-rays than are ionization chambers which are commonly used to measure X-radiation, and over a thousand times more sensitive than photo-electric cells, such as those used in "electric-eye" applications.

The crystals are extremely sensitive, stable, and instantly respond to variations in the intensity of X-rays. Because of the 1,000,000-to-1 gain, they do the work that hitherto required a much more complex system of vacuum tubes and amplifiers, while at the same time allowing the use of low-intensity X-rays.

Scientists believe that the use of crystals as sensitive energy converters and amplifiers opens up a new field of crystal-electric engineering.—*General Electric X-Ray Corp.*, 4855 *Electric Ave., Milwaukee* 14.

Evaporator Purifiers Are Highly Efficient

Internal "Upflow" purifiers for use in food processing, power generation, and similar applications, are announced in three models, 1-, 5-, 11-piece. They are for use inside industrial evaporators, and other large tanks, to remove entrainment from vapor, steam, air, and gas passing through.

Efficiency of these purifiers is stated to be extremely high. Pressure drop is reported to be negligible even at vapor velocities in excess of 25,000 fpm.

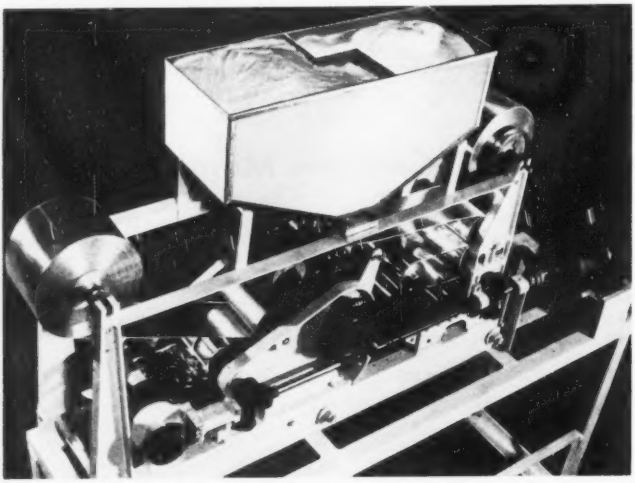
Type AFE is a one-piece unit for installation in evaporators with a large outlet nozzle through which it can be passed for assembly. Type AFD-1 is made in five parts for convenient installation through a large manway or similar rectangular space provided for access. An eleven-piece assembly, AFD-2, is designed for in-

stallation in chambers where access may be made only through small outlet nozzles or cramped manways. Latter unit, maker states, permits purifier installations to be made inside evaporators which otherwise would be inaccessible.

Assembly within tank or evaporator may be done three ways: With a continuous weld, flange assembly, or stud bolt support. Standard AFE line of purifiers are of all-welded mild-steel construction. Sizes, ranging from 12- to 36-in., are furnished with bolting clips and outlet collar.

Operating principle of purifiers, states maker, is essentially simple. Extremely high separating efficiencies without pressure drop are obtained through the correct application of centrifugal and centripetal forces governed by stationary tuyere vanes tangentially located around the circumference of the purifier. Entering vapors are driven into a whirling mass that throws entrainment against the inner walls of the chamber, where its gravity drains into annular races and is expelled through eject tubes. A vortex cone is used inside the purifier chamber to stop vortex action, eliminating the possibility of re-entrainment.

By providing self-cleaning action, and through elimination of moving parts, maintenance and servicing costs are reported low.—*The Centrifix Corp., Payne Ave., Cleveland.*



Multi-Product Packer Is Highly Accurate

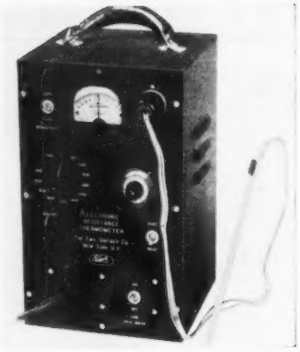
Air-tight product protection, extreme accuracy of fill, and low production costs are advantages reported for the Heco-Packer.

For making the packages, there are two roll-fed heat-sealing aluminum foil ribbons. From these, the packer prints, forms, fills, and hermetically seals the package in one continuous, automatic operation. Resulting container is, in effect, a flexible foil "sandwich", with the product contained in as many separate, heat-sealed unit pockets as desired. Unit operates at speeds up to 120 per min.

Machine in illustration produces a foil package which is actually a two-in-one container, both materials being held separately in different portions of the packet. To do this, maker's engineers tailored the packaging machine to fit the particular product.

Master roller die—which forms the carefully computed unit cavities in the foil sheet—and other attachments were planned for two product cavities. A divided hopper and filling system was also designed. Where powder dosages are concerned, maker states machine will control accuracy of fill to a tolerance of 1 percent in exact volume or weight. Similar accuracy can be maintained through magazine feeds for non-free-flowing products, such as tablets.

Another feature of the packer is that it can be used with one roll of foil and another roll of transparent film, such as Pliofilm, heat-sealing Cellophane, or polyethylene.—*Holmes Equipment Corp., South San Francisco.*



Electronic Thermometer Is Easy to Operate

An electronic-resistance thermometer, complete with bridge and bulb, is claimed to be less expensive than non-electronic units. It plugs in like a radio. No permanent installation is necessary.

The resistance bulb has a tungsten coil sealed in Pyrex glass or molybdenum in solid quartz. Calibration is simplified so that the instrument is reported practically direct reading, eliminating calculations.

The thermometer has 13,000 divisions and measures temperatures up to 1,000 deg. C. with an accuracy of .1 deg C. and a sensitivity of .01 deg. C. A dead heat balance indicator and single range switch and slide wire are stated to make rapid reading of the bridge possible.—*Emil Greiner Co., 20–26 N. Moore St., New York 13*

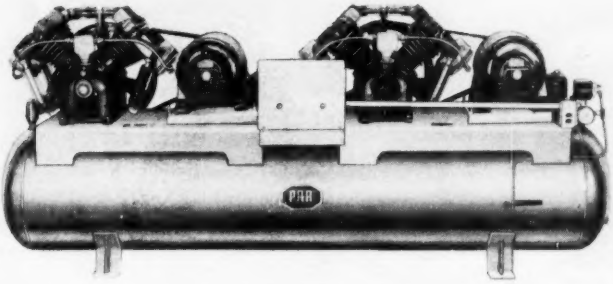
Motor Starter Protects Personnel, Machine

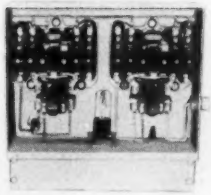
Called the Motor Watchman, new motor starter provides overload protection for single phase, polyphase and dc. motors. Ratings are up to 600v., 7½ hp. polyphase, 5 hp. single phase, or 220v. 1½ hp. dc.

Personnel protection features are the self-indicating handle, interlock cover that prevents opening unless starter is off, and safety latch to lock starter off during servicing.

Positive motor protection is provided by the quick-make, quick-break over-center toggle mechanism—Deion Arc Quenching—and the bimetallic disk-type thermal overload relay.

Straight through wiring eases installation and servicing, and Bonderized enclosure prevent blistering, flaking and corroding.—*Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30.*





Control Unit on Air Compressor Lowers Electrical Starting Load

Delayed starting control—providing new versatility in this PAR Model 100 (10 hp.), air compressor—is now announced.

New electrical control makes possible big savings in starting amperage and extra wiring. In operation, the second motor is automatically started 10 sec. after the first, reducing the amount of electrical load required by simultaneous starting of both motors. With delayed starting, each motor can be run independently, assuring air power at all times.

Delayed starting control unit employs pressure switches actuated by an electronic tube that is hermetically sealed from dust and dirt. Tube can be replaced in less than a minute.—*PAR Compressor Div., Lynch Corp., Toledo, Ohio.*

More Than 50 New Features Built Into '51 Trucks

To provide faster, safer and more economical hauling of larger payloads, more than 50 new features have been incorporated in the Dodge B-3 Series of "Job Rated" trucks. Increased power, improved steering for easier handling, more driver comfort, and newly designed shock absorbers are among them.

In some of the eight engines powering the new truck line, horsepower increases range as high as 20 percent. Gross vehicle weight ratings range from 4,250 to 40,000 lb., and gross combination weight ratings range up to 60,000 lb.

Higher governor settings, redesigned fuel pumps, and spark plugs that are "hotter" and that have improved moisture-proofing, also larger-capacity generators, a new high-torque starting motor, and more efficient cooling systems are among engine improvements that provide the new line with greater power and economy.

For easier riding and better handling, the new Oriflow shock absorbers are introduced on the ½, ¾, and 1-ton models. Featuring an entirely new valving system, they have been specially designed to provide better ride-control on all road surfaces.

Brakes have been improved on all models. All brake cylinders now are anodized for positive protection against rust and corrosion. A new Cyclebond molded tapered lining was developed to give brakes smoother, more positive action, and to reduce

DON'T MISS THESE . . .

Automatic titrator speeds, eases laboratory work. Provides technician with more free time....Page 139

Combination unit packs produce fast, has weight accuracy within one piece, plus or minus.....Page 140

New line of corrosion-resistant fittings are designed for easy installation.....Page 143

Centrifugal compressor aims at lower operating and maintenance costs. Has hermetic sealing.. Page 151

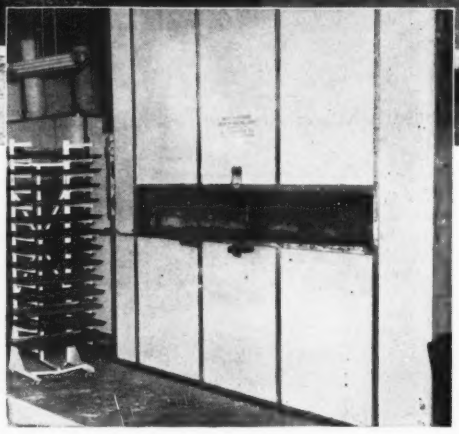
AND WATCH FOR . . .

Double-closure bin valve that is completely dust-tight in both open and closed position.....May FE

Electric, semi-noiseless vibrators in new type models for hoppers, bins, and chutes.....May FE

Three Girls Bakery, San Fernando, California

THREE GIRLS BAKERY cooks with *GAS* to make *"the best you ever tasted!"*



Foreground: 40 pan Gas-fired Middleby-Marshall revolving oven, with top capacity of 10,000 bread loaves a day. The Gas-operated 12 pan Dalton oven in the background bakes pastries, cookies, etc.

HOME QUALITY IN QUANTITY PRODUCTION is the exacting requirement demanded of Three Girls Bakery by owner G. W. Fredericks of San Fernando, California.

Housed in a new building, the bakery plant is designed to supply 20 to 25 retail outlets. To assure consistent uniformity of bakery goods, Three Girls Bakery is equipped with two Gas-fired revolving ovens, the 40 pan Middleby-Marshall, and the 12 pan Dalton.

A Gas-fired boiler provides steam, which is used to cook all fillings. The large amounts of steam needed for bakery clean-up are also produced by the boiler.

The efficiency of Gas—baking heat when you want it; the controllability of Gas—baking temperature where you want it, the economy and cleanliness of GAS all work for you to keep baking costs at a minimum.

Your Gas Company Representative knows the answers—call him today. Let him put GAS to work for you.

Slogan of Three Girls Bakery

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE
NEW YORK 17, NEW YORK

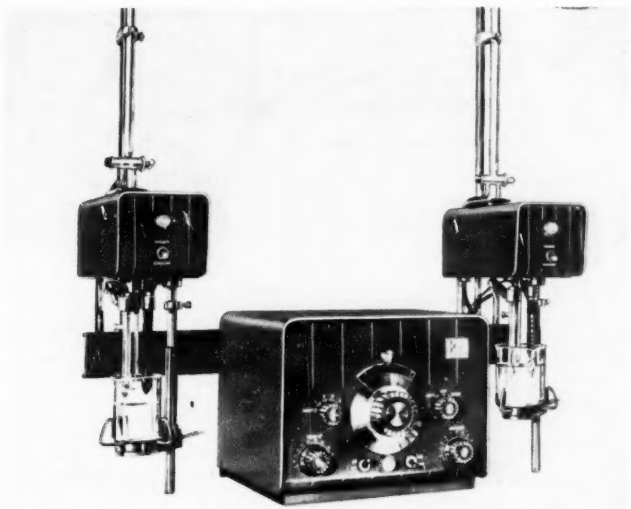
tendency to grab or squeal. New lining is now used on all models not equipped with air brakes from 1½-ton up.

Loading heights are even lower than before on all models from the ½- through the 2-ton. This was accomplished by redesigning the rear springs. To assure easier and faster loading of ½-ton panel, upper flange of center of rear bumper also was depressed to make a step.

In higher-tonnage trucks, power and economy benefits of twin carburation and twin exhaust are now provided on the R (2¾-ton), T (3-ton), and V (3½-ton) models. Engine output on these trucks has been greatly increased —from 106 to 125.5 net hp. on the R model, and from 111.5 to 134.5 net hp. on the T and V models. Result is higher average road speeds, faster hill climbing, greater economy, and less driver fatigue.

Styling on all models features a new grille formed by two large horizontal louvers. Wrap-around bumpers give fenders more protection.

Thicker seat-pad cushions and recontoured seat-backs give greater comfort for driver. Instruments are arranged in a cluster on dash. Visibility has been increased by lowering front of hood line.—*Dodge Div. Chrysler Corp., Detroit* 31.



Automatic Titrator Speeds, Eases Lab Work

This new instrument handles routine titrations completely automatically. Thus, the laboratory technician is released from the strain and monotony of manual titrations and has more time for preparing samples and calculating results.

Unit not only makes accurate titrations more rapidly and conveniently than is possible by manual methods, but it also gives objective, reproducible results that are free of personal-factors errors.

Titrator is unusually simple and convenient. In a series of titrations it is only necessary to fill the burette, place sample in beaker, then turn rest of operation over to unit. Raising the beaker holder into position automatically starts the stirrer motor and begins delivering titrating solution into the sample.

Noteworthy feature is unique circuit that electrically anticipates the approaching end point, scaling down delivery of solution in progressively smaller increments to assure a highly accurate titration. When end-point is reached, delivery of titrating solution automatically stops and a light signals completion of operation—all without any further attention from technician.

Operation of instrument is so simple that no special training is required to handle any of a wide range of titrations. Neutralization, oxidation-reduction, precipitation, complex-formation, and other types of titrations encountered in the modern laboratory, can all be performed automatically, rapidly and accurately. Only 1-1½ min. are required to complete many routine titrations, and even those to 0.1 per cent accuracy can be completed in 2½ min. or less.

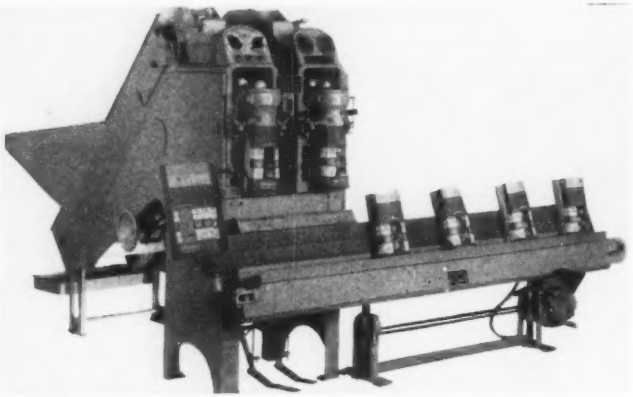
Unit has been designed to provide utmost adaptability to the varying requirements of modern laboratory operations. The adjustable holder accommodates beakers or similar vessels from 10 ml. to 400 ml. capacity, and instrument may be used with all standard burettes down to 5 ml.

As many as 4 delivery units can be accommodated by a single amplifier control unit, thus making a wide choice of titrating solutions instantly available. As a further convenience, ample provision has been made for mounting heating devices or other special equipment without interfering with operation of titrator. Both the control unit and the titrator unit are enclosed in all-metal cases that require only minimum attention and give trouble-free protection to the internal parts.

In addition to its use as a titrator, this new development can also be used as an a.c.-powered pH meter to give accurate readings over the range 0. to 14 pH.—*Beckman Instruments, Inc., South Pasadena, Calif.*

Bung Bushing Barrel Pump Gives All-Around Service

Low-priced, pull-type barrel pump is designed for all-around can-filling of light liquids. The bung bushing securely holds pump to drum. It fits snugly around the tube and prevents foreign matter from entering at this point. Operator tightens the thumb screw and locks both bung and pump with one operation. It fits 1½- and 2-in. openings of 15- to 55-gal. drum. It is all steel except the spout and weighs only 5 lb.—*General Scientific Equipment Co., 2700 W. Huntingdon St., Philadelphia* 32.



Combination Unit Packs Produce Fast, Accurately

For filling any type dry product into any style consumer container, a new combination-unit has been announced. It is comprised of the G2C Gross Weighing Machine, with a Model 0-1 Angle Conveyor, which is designed for the handling of certain produce items.

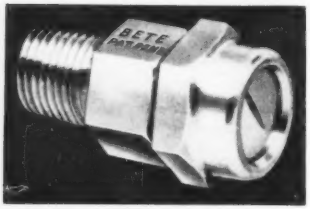
This "Elec-Tri-Pak" provides a fast bagging operation with accuracy of controlled weighing to plus or minus one piece of items handled. Machine requires but one operator, whose single task is to place empty open containers up to one of two filling spouts. At moment of placing container around filling spout, operator controls a positive mechanical bag holding and release mechanism by means of a simple foot pedal. After bag has been properly placed in position, automatic weighing and filling of produce being handled commences.

Once this cycle has been started, operator then places a bag on other filling spout, where same operation occurs. In the meantime, first scale has completed weighing and filling cycle, and operator then releases bag to Take-Away Conveyor. Then cycle is repeated.

While this specific bagger has found most of its application in the onion field, it will handle such items as lemons, limes, apples, oranges, and smaller sized potatoes, in amounts up to 5 lb.

Single operator is capable of weighing and filling, to within a controlled range of one piece plus or minus, 14-18 bags per min. on 1 lb. size of No. 1 onions; 12-16 bags per min. on 3 lb. size; and 10-14 on 5 lb. size.

Model 0-1 Angle Conveyor is synchronized to operate in conjunction with the bagger. Filled bags are placed on this two-belt conveyor (both belts move at the same rate of speed), and transported to whatever type of closing is employed.—*Triangle Package Machinery Co., 6633-55 W. Diversey Ave., Chicago.*



New Nozzles Afford Better Coverage

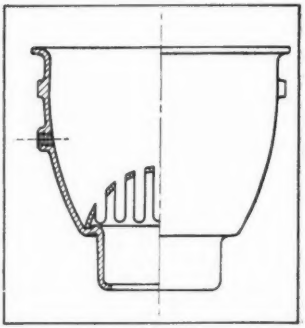
More uniform coverage with less waste of spray is claimed with use of an improved line of flat spray or fan nozzles.

Side jets, or "horns," containing coarse droplets have been eliminated, and the spray pattern has been made heavier in center than at edges of fan. Maker states there is less overspraying due to doubling up of sprays from adjacent nozzles, with result that combined coverage is unusually uniform.

The "F" series nozzles include 13 disks made of long wearing stainless steel. Flow rates are of 1/10 to 10 gpm., and spray angles of 50 to 90 deg. All disks are interchangeable in a brass base and cap assembly having a ¼ in. male pipe connection. Built-in, removable strainers are available for the smaller nozzles.—*Bete Fog Nozzle, Inc., Greenfield, Mass.*

Want More Information?

It's free—and easy to get. Simply note here the items on which you want more details, then turn to the Reader Service Section inside the back cover, where all are listed by pages and by subjects under, "Editorial: New Equipment, Supplies"—each one with a page key number after it. The key numbers also appear on the handy Reader Service postcard. So you circle those for the items that interest you, sign at the bottom, and mail. No postage is needed.



Floor Sinks Insure Against Sewer Water Back Up

Sanitary features engineered into these floor sinks are stated to insure against contamination by sewer water backing up into the water supply. An air gap between the fixture drain and the floor sink does the job.

The sinks are for use as drains for large kettles and similar equipment in canneries and packing plants, and also as floor drains. Each sink has an acid-resisting porcelain enamel finish on all exposed parts. A removable strainer for semi-dome shapes is designed to prevent splash and promote rapid flow. Each unit is 8 in. deep in size.

An optional feature is tapping of the body of the sink for installation of a trap primer, to insure sanitary functioning of traps in drains that may be unused for 48 hr. or more.

Both round (photo) and square models are offered. Latter may be furnished with or without a lip level grate (which permits sink to be used as a floor drain). Both types require only 1 ft. square of floor space and have an overall depth of 10⅝ in. They may be in polished bronze, C. P. bronze, or nickel bronze.—*J. A. Zurn Mfg. Co., Erie, Pa.*

Patapar Keymark nationally advertised symbol of wrapper protection

Wonderful for:

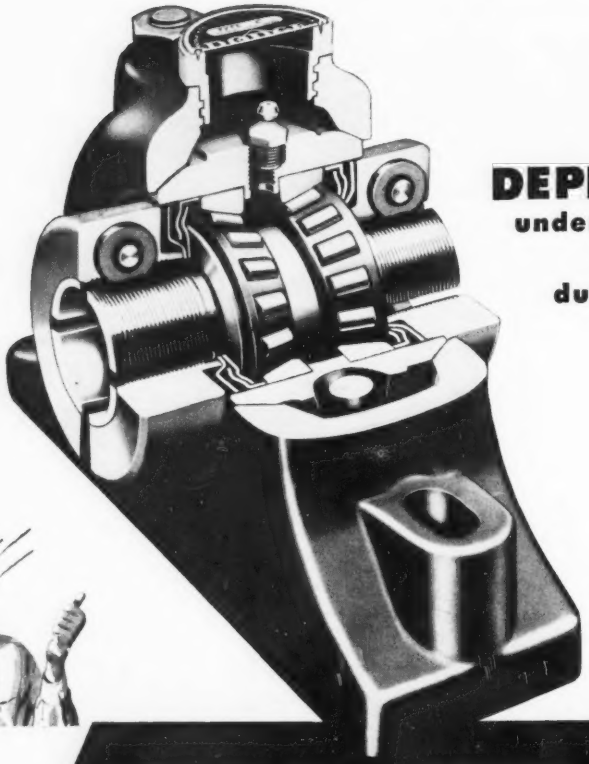
Butter wrappers
Ham boiler liners
Deep freeze wraps
Can liners
Fish wrappers
Cheese wrappers
Margarine wrappers
Milk and cream can gaskets
Bacon wrappers
Vegetable wraps
and many other uses

Patapar
REG. U.S. PAT. OFF.
HI-WET-STRENGTH
GREASE-RESISTING PARCHMENT

Yes, Patapar Vegetable Parchment welcomes water, grease, even a good boiling! Its appetizingly clean, white surface lends itself to beautiful color printing.

For the whole story of this remarkable paper, and with *future* needs in mind, write on your business letterhead for booklet T, "The Story of Patapar."

Paterson Parchment Paper Company • Bristol, Pennsylvania
Headquarters for Vegetable Parchment since 1885
West Coast Plant: 340 Bryant Street, San Francisco 7, California
Sales Offices: 122 E. 42nd Street, New York 17, N. Y. • 111 W. Washington St., Chicago 2, Ill.



DEPENDABLE
under severest conditions of dust and dirt!

DODGE-TIMKEN

- Even under layers of grime, dirt and abrasive dust encountered in many production operations, the Dodge-Timken Type C bearing carries its power load smoothly, efficiently, without interruption—because it's
- Triple-sealed to prevent the entry of dust, however fine. Accurately machined steel seals keep dirt *out* and lubricant *in*.
- Dodge mounts, seals, houses Timken precision bearing units in rugged assemblies (four different types) to deliver a minimum of 30,000 hours uninterrupted service.
- Dodge Timken Type C Pillow Blocks are fully self-aligning, with both radial and thrust carrying capacity.
- Delivered fully assembled, adjusted and lubricated, ready to lock on shaft. Locking collars at both ends insure firm fastening.
- Normally available from Dodge Distributors' stocks, sizes from 1-7/16" to 4-15/16".

DODGE MANUFACTURING CORPORATION, 2800 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor for assistance on new, cost-saving methods. Look for his name under "Power Transmission Equipment" in classified phone book.

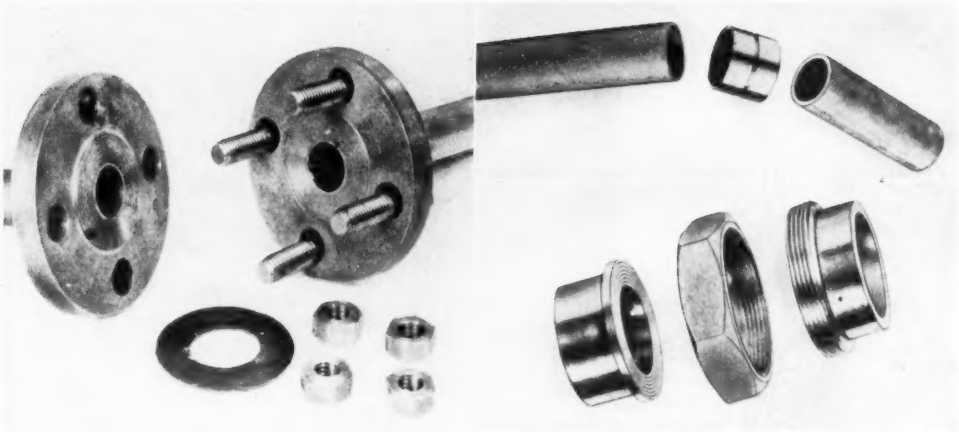
FIRST IN POWER TRANSMISSION MACHINERY!

V-BELTS AND TAPER-LOCK SHEAVES

TORQUE-ARM SPEED REDUCERS

ROLLING GRIP AND DIAMOND D CLUTCHES

SOLID STEEL CONVEYOR PULLEYS



New Corrosion-Resistant Fittings Are Designed for Easy Installations

To simplify installation and reduce costs of process piping jobs, a new line of corrosion-resistant fittings has been designed.

In addition to standard tubing sizes, fittings are made for use with corrosion resistant pipe in Schedules 5S, 10S and 40S.

Speedline insert flange (shown in left photo) consists of a corrosion-resistant, serrated insert in a carbon steel flange. Unit is reported to combine good strength at connection and corrosion resistance throughout internal area.

Installation of piping layouts is simplified in several ways. The assembly does not have to be heat treated, as is frequently necessary after welding. Pipe cutting to exact length is simplified, since the thickness of a gasket is the only "allowance" which must be made.

Flange is said to eliminate many of the difficulties previously encountered in threading, vanstoning or welding in connecting corrosion-resistant piping. An expanding tool and plain wrench are the only tools required for installing the insert flange.

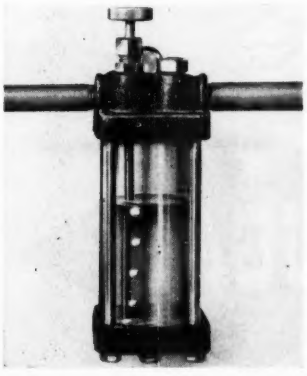
Sizes available include standard (O.D. and gage) tubing and nominal pipe sizes from ½ through 6 in.

Upper right photo shows the aligning connector and its use with two standard pipe schedules. Same connector can be used with Schedule 40S pipe (right) and light-walled Schedule 5S pipe (left). Both pipes have the same O.D. size, while the Schedule 5S pipe has a larger internal cross section.

Thus, this connector permits the use of light-walled, lower cost, Schedule 5S corrosion-resistant piping in conjunction with present installations of Schedule 40S pipe. In a number of installations, the connector has been used with Schedule 5S pipe as a means of increasing internal flow areas in piping systems.

Connector is made in pipe and tubing O.D. sizes from ½ through 4 in. Methods of joining include soft soldering, silver brazing, and also socket welding.

New tube and pipe union shown in lower right photo combines best features of screwed pipe union and sanitary tube union. Unit weighs less than present sanitary fitting, and it is bimetallic. Hex nut is made of carbon steel or Monel, while parts coming in contact with corrodents are made of metals suited to the particular applications. Union is made for ½- through 4-in. applications.—*Horace T. Potts Co., Erie Avenue & D St., Philadelphia 34.*



Unit Controls, Indicates Air and Gas Flow Rate

Relatively small rates of flow in gas and air lines can be controlled and visually indicated by this sight feed bubbler.

In operation, the entire flow of gas or air is passed through liquid in a transparent cylinder, where rate of flow is shown by bubbles rising through liquid. Any desired liquid may be used. A needle valve at top permits selection of any rate of flow from less than 1 bubble per sec. to approximately 20 cu. ft./hr.

Typical applications include bleeding air into lines to purge them of corrosive fumes, and use with hydrostatic liquid-level gages to control and show the flow of compressed air required for continuous gaging.

Drain plug at bottom permits easy removal of excess liquid built up by condensation of moisture in gas or air. Cylinder is glass or plastic, depending on pressure requirements. All units are factory-tested at 100 psi or higher. Four tie rods protect the cylinder and permit easy disassembly.

Unit may be mounted on front of panel or supported in the line by the inlet and outlet pipes. Inlets and outlets at the sides and rear give a choice of four piping connections.—*King Engineering Corp., Box 500, Ann Arbor, Mich.*

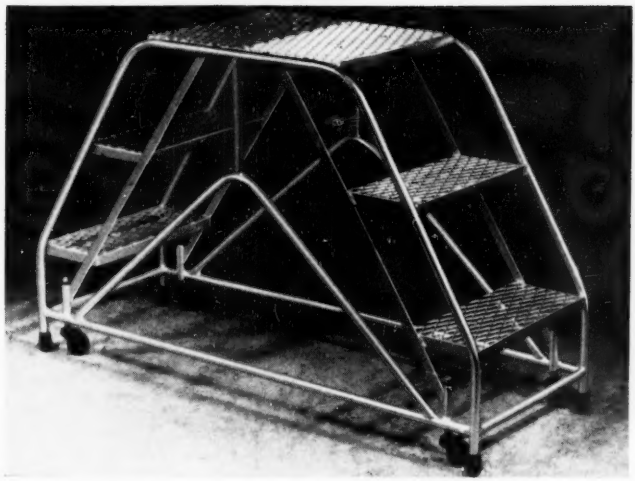
Some things give solid satisfaction

First catch of the season—and worth all the time and trouble it took to get to your favorite stream! You get the same satisfaction when your "know-how" turns out a top quality product—a product that repays your judgment with stepped-up sales.

Of course, you've used sugar. And the world standard of quality is sucrose—sugar derived from sugar cane and the sugar beet. In food manufacturing, it has more sweetening power, gives uniform quality, and brings out, better than other agents, the fine flavors of higher-priced ingredients.

If you want certain acceptance for your product—as who doesn't?—you'll use the best bait—sugar. It pays off in solid satisfaction!

SUGAR
INFORMATION INC.
NEW YORK 5 NEW YORK



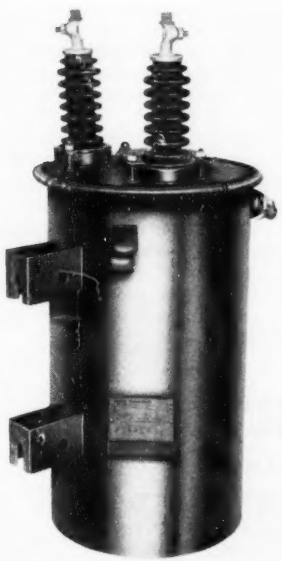
Double Step-Ladder Saves Time, Cuts Accidents

In busy, congested areas, use of this new, double, safety ladder increases output and reduces mishaps. With steps on both sides, two or more people can use it at one time in stock-room aisles.

When no one is on the ladder, it rolls easily on swivel casters. But the instant a person puts weight on it, spring-mounted casters deflect so that rubber-tipped legs engage the floor and the ladder will not roll.

Frame of the ladder is made of welded tubular steel. Steps, of expanded steel to give a non-slip surface, are welded to bar stock for rigidity. Ladder is 30 in. high, 17½ in. wide, and 48 in. deep. Top step has a 20-in. tread; others have a 7-in. tread.

Model 3-SA (photo) is finished in aluminum paint.—*Ballymore Co.*, 139 *Pennsylvania Ave., Wayne, Pa.*



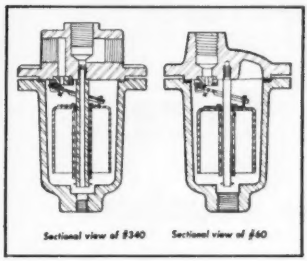
New Clamp, Oil Extend Life of Transformers

Sealed-tank features are now being attained in a line of distribution transformers by an entirely new method of fastening the cover to the tank.

Called, "Shur-Seal," the cover clamp consists of a ring of V-shaped cross section which fits over edge of cover and lip of tank. Tightened by means of a single bolt, this ring exerts a pressure equal at all points, so that the cover gasket is uniformly compressed to form a positive seal between cover and tank.

No "breathing" can take place, and there is no danger of oil leakage during the shipment or handling. Drainage channels are provided to prevent water from accumulating on the transformer cover.

Form W transformers are now being filled with the new inhibited transformer oil, reducing oxidation to a minimum and thereby retarding formation of acids, sludge, etc. which ultimately causes deterioration of insulating oils. Minimizing of oil contamination, through use of new cover clamp and inhibited oil, greatly prolongs service-free life of transformers.—*Wagner Electric Corp.*, 6400 *Plymouth Ave., St. Louis* 14.

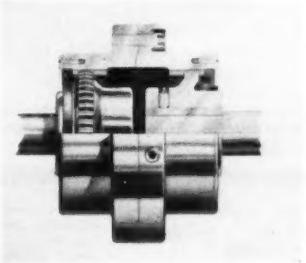


Forged Steel Steam Traps Safe at High Pressures

These small, high-pressure steam traps are stated to offer a high degree of safety because of forged steel construction in head and body. For superheated steam service, the traps can handle pressures up to 500 lb., temperatures to 800 deg. F. in ½- or ¾-in. pipe connections.

Internal parts are of stainless steel, with valve and seat of Anderloy, special alloy for steam service. Recessed gasket prevents blowing out.

Illustrated are two types of forged traps, additions to the Super-Silvertop line. Number 340 is installed straight-in-line or as an elbow eliminating nipple and fitting. Number 60 is for vertical installation.—*V. D. Anderson Co., 1935 W. 96 St., Cleveland 2.*

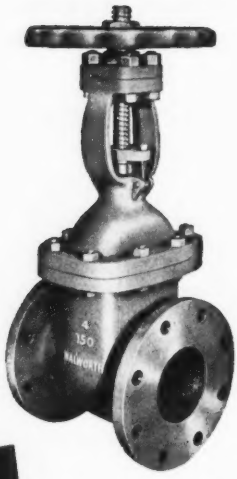


Coupling Solves Alignment Problems

Angular and offset misalignment up to 7 deg. can be handled with standard models of a new dihedral coupling, while special units can handle up to 12 deg. misalignment.

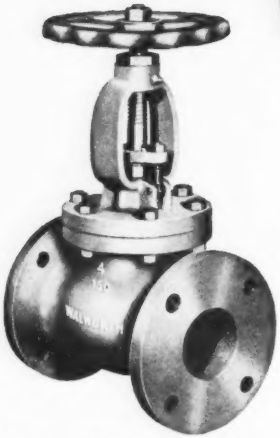
Key to this performance is the dihe-

Newly Designed Walworth Valves to combat corrosion



Walworth 150-pound Stainless Steel Gate Valve . . . available in sizes ½ to 3-inch, screwed; ½ to 12-inch, flanged.

Made of Stainless Steel
Monel · Nickel
Acid-resisting Bronze
Ni-resist



Walworth 150-pound Stainless Steel Globe Valve . . . available in sizes ½ to 3-inch, screwed; ½ to 6-inch, flanged.

Sectional view of Walworth 300-pound Stainless Steel Gate Valve . . . available in sizes 2 to 6-inch, flanged.

— ENGINEERED AND TESTED FOR TOUGH . . . HARD SERVICE

Walworth offers a comprehensive line of valves made of several cast stainless steels and special alloys for piping services where corrosion is a factor. These valves are available in Gate, Globe, Angle, Check, and Lubricated Plug types.

Gate, Globe and Angle Valves have outside screw and yoke construction, thus keeping the stem threads out of contact with the corrosive material in the line. They also have a two-piece bolted gland with ball-type gland follower to prevent binding the stem when packing bolts are tightened. Gland eye-bolts can be conveniently swung out of the way without danger of loss when the gland is lifted for repacking.

Gate Valves have taper seats with a unit consisting of two flat faced discs supported by a carrier on the end of the stem. The discs are of a proven ball-and-socket type. They are free to rotate and adjust themselves to the body seat angles, assuring tight seating with no possibility of sticking in any position.

For further information about Walworth's full line of corrosion-resistant valves, see your Walworth distributor.

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

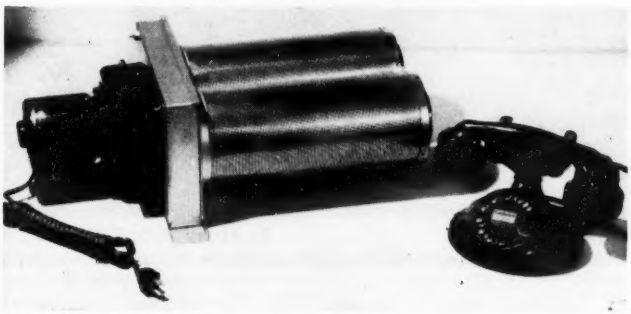
DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

dral tooth shape (contact surfaces sloping down from center). It provides more contact than usual-shaped teeth.

At ordinary conditions of misalignment, the driving area is at tooth center, but at maximum offset, driving area spreads over an entire half tooth.

The coupling can save time on lining up equipment and simplifies machine design by eliminating necessity for precision alignment. And it solves normal alignment problems caused by bearing wear, old or inadequate wooden floors, weaving chassis or mountings.

Special flangeless or sleeve type couplings are offered where outside diameters must be held to a minimum. —*Ajax Flexible Coupling Co., Inc., Westfield, N. Y.*



Device Provides Easier Air-Pollution Testing

A ready means of determining atmospheric pollution is provided with this simple activated-carbon gas and vapor adsorber, recently developed.

Whether for indoor comfort or outdoor nuisance abatement, checking on the prevailing concentration of air-entrained gaseous and vaporous contaminants is a common problem in air purification.

Activated carbon will adsorb petroleum and hydrocarbon vapors, the odors from decomposition and putrefaction, the so-called aromatics, and most of the air contaminating gases incidental to industrial, chemical and food processes.

Moreover, the carbon's adsorptive capacity, efficiency, and retentivity for these widely varied substances is predictable. And further, the actual sorption is measurable, since the sorbed substances can be reclaimed by the process of reactivation.

Thus, activated carbon can be employed fairly indiscriminately to ascertain the prevailing concentration of one, several, or a conglomerate variety of air-entrained gaseous impurities.

In order to do this, there is required: (1) a collecting apparatus which will induce a known volume of the contaminated air through a known quantity of granular activated carbon uniformly over a known period of time, and (2) the facility for recovering the sorbed impurities so as to relate them in terms of concentration per unit of air from which they were extracted.

Collecting device consists essentially of dual, perforated, activated carbon-filled canisters assembled integrally with a motor-driven air blower. Purpose of duplicate canisters is to provide flexibility or accelerate testing. For example, one canister can be continued in operation while the other is under analysis. Cumulative collection can be resumed after such analysis indicates it is advisable.

Design of unit is such that 40 cfm. of contaminated air can be drawn through a continuous, uniformly dense 0.7-in.-thick layer of 6-14 mesh granular activated carbon at a linear velocity of 25 fpm.—well within critical limit of odor break-through.

By operating unit continuously in a contaminated atmosphere for a known duration, total volume of air passed through carbon is known. And, adsorbable impurities entrained in that volume of air will be collected by the unit for check.

Canisters are then separated from unit, sealed, and returned to laboratory for reactivation,—the extraction of adsorbed impurities. Such analyses may be simply quantitative or both quantitative and qualitative, depending on purpose for which determination is made.—*W. B. Conner Engineering Corp., 500 Fifth Ave., New York.*

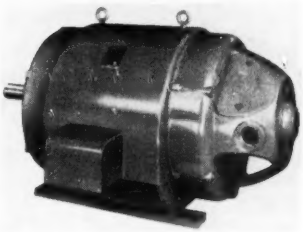
Slide Chart for Bending Of Stainless Tube

Data on desirable minimum radii for economical bending of stainless tubing and pipe is presented on a slide chart recently prepared.

Chart covers tubing ranging from $\frac{3}{8}$- to 5-in. O. D. size, in B. W. gages from 22 through 11. Radii are given for machine bends (with and without mandrels) of 90 and 180 deg. Radii for bends of 45 to 180 deg. in ornamental grade stainless tubing are also provided.

Stainless pipe schedules 5, 10 and 40 are described, and recommended coil diameters for stainless pipe from $\frac{1}{8}$ to 4 in. are included.

Chart also contains tables of standard sizes for round stainless tubing and pipe, a table for determining theoretical bursting pressures, and a table of analyses and physical properties for various types of stainless tubing.—*The Carpenter Steel Co., Alloy Tube Div., Union, N. J.*



Heavy-Duty Motors Give Flexible Power

Providing variable speed drive, new line of heavy-duty wound-rotor induction motors are stated to be advantageous on applications requiring high starting torque and low starting current, or long acceleration.

Built in ratings from 30 to 1,500 hp., drip proof construction is standard, but splash proof or enclosed forced-ventilation models are also available.

The heavy-duty fabricated steel frame features high physical impact strength and crack-proof steel-bar feet. Both ball or split-sleeve type bearings provide long wearing qualities and are easily accessible for inspection and maintenance.

Brush pressure is adjusted with a ratchet wheelbrush tension adjustor that provides metered step by step increase or decrease of pressure. Cover plates can be removed with the fingers. —*Electric Machinery Mfg. Co., Minneapolis, Minn.*

COMPARISON PROVES the VALUE of VEELOS

the Adjustable V-Belt...

IF you use v-belts you'll be interested in this clear statement of facts about VEELOS, the link v-belt, and endless v-belts.

These 4 reels of Veelos provide up to 316 standard v-belt sizes.

COMPARISON TABLE
VEELOS and ENDLESS V-BELTS

what about...	Veelos V-Belts	Endless V-Belts
ADJUSTABILITY	*Any* length can be provided for *any* v-belt drive due to link construction.	Standard or special lengths must be supplied for *individual* drives.
INVENTORY	MINIMUM INVENTORY. 4 reels can care for every v-belt need in the O, A, B and C widths. No deterioration or obsolescence of spare belts.	LARGE INVENTORY. 316 sizes are required to provide a *complete* stock in the O, A, B and C widths. Spare belts not immediately used will age and deteriorate.
STOCKROOM STORAGE	SMALL SPACE. It takes less than 2 square feet of wall or floor space to store 4 reels of easily identified Veelos.	LARGE SPACE. Walls and ceilings are often covered with stocks of endless v-belts. Identifying and maintaining full stocks is difficult and costly.
INSTALLATION	Installs quickly *on any drive* without resetting motor or tearing down outboard bearings.	Necessary to reset motor and tear down drives with outboard bearings.
MAINTENANCE	Belts can be adjusted or replaced without moving the motor.	Sliding or pivoted motor bases are necessary to replace endless v-belts. Belts cannot be adjusted individually.
OPERATING EFFICIENCY	Full power delivery can be maintained because the tension of each belt in a matched set is kept uniform by removing or adding links.	Individual belts cannot be adjusted to maintain uniform tension and provide full power delivery.
DRIVE LAYOUT	No limitations are imposed by belt length.	Limited by the availability of standard or special belt lengths.

If you would like to learn more about Veelos—how it can save you money and keep your machines producing—write today for your copy of the Veelos Data Book. It's free and full of facts!

VEELOS
THE LINK
V-BELT

MANHEIM MANUFACTURING & BELTING COMPANY
MANHEIM, PENNSYLVANIA

... ADJUSTABLE TO ANY LENGTH ... ADAPTABLE TO ANY DRIVE

Made in all widths in three types: regular, oil-proof and static conducting. Also double V in A and B. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 350 distributors throughout the country. VEELOS is known as VEELINK outside the United States.

Refrigeration Unit Cools Truck Interior Evenly

New features of the Arctic Traveler, designed for trailer and truck refrigeration, provides even distribution of cool air over the entire area of the refrigerated enclosure, lower operating costs while affording greater flexibility in operations.

A 1-ton unit is designed for city delivery and general short run operations of 8 hr. or less. Temperature is maintained at 35-45 deg. F. in bodies in the 500 cu.ft. range. For trailers in the 1,500 cu.ft. class a 2-ton unit is available.

Smaller unit has a 1-cylinder 4-cycle air-cooled, 1,800 rpm., 3.5 hp. engine while the larger unit has a 2-cylinder 4-cycle air-cooled, 2,400 rpm., 13 hp. engine.

Evaporator is designed to permit fast reduction in temperature, and the coil permits the air to come in contact with the greatest number of tubes. Aluminum cross-fin construction assures high efficiency.—*American Manufacturing Co., Montgomery, Ala.*

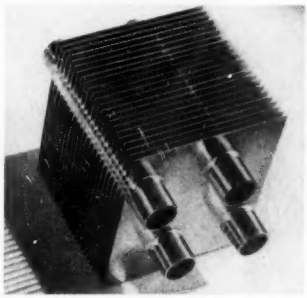
Handles Loads Without Conventional Pallets

Unit loads are readily moved without use of conventional pallets with a redesigned PUL-PAC, fork-truck device. New model is described as incorporating improvements developed as a result of users' experience.

Principal change from early design is adoption of a pantograph-type linkage to actuate the gripper-jaw and pusher rack, in place of the long piston rods employed on previous models. Now construction allows a shorter hydraulic stroke from a more powerful piston, and it eliminates the severe bending stresses to which the long pistons were subjected. Strong side forces formerly exerted on the long pistons are now absorbed by the pantograph, which is ruggedly built. All device structure back of uprights has been eliminated, providing greater visibility and safety for driver.

New unit can operate in less space than former models. There are no restrictions on tilt of uprights. Unit has a detachable mounting, and is interchangeable with standard forks up to 54-in. usable length.

Rack and gripper-jaw can be lowered slightly when fully extended to engage and grip carrying sheets flat on floor. Mechanism is easily disassembled for service.—*Clark Equipment Co., Battle Creek, Mich.*



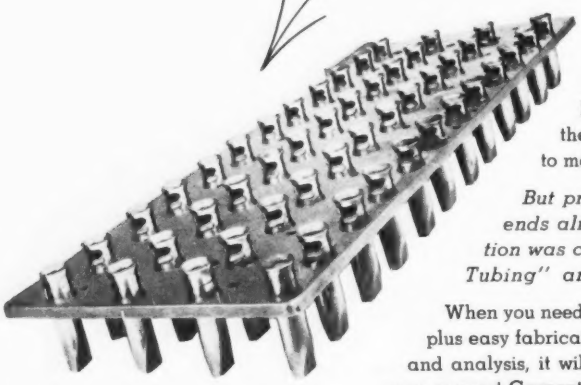
Heat Exchanger Has Mechanical Joints

A heat-exchange unit requiring no welding or soldering in the assembly has been developed. The corrosion-resisting coil has a mechanical joint stated to withstand repeated expansion and contraction caused by heating and cooling cycles.

In making the exchanger 5/8 x .049 in. wall stainless tubing is mechanically bonded to flat plate-type fins of stainless steel in the following manner: The fins are stamped and belled, forming a bonding collar at each opening. This provides a broad flat surface instead of a sharp edge at point of contact with the tube. A tool steel bullet, propelled by compressed gas, is forced through the stainless tube, expanding it uniformly against the continuous surface formed by the collars of the fins.

The tubes, machined to exacting tolerances, are supplied by the Carpenter Steel Co., Union, N. J.—*The Trane Co., La Crosse, Wis.*

FOOD PRODUCER DEVELOPS NEW PRODUCTION IDEA with *Carpenter* Stainless Tubing



Exactly the right temper for swaging and flaring, and a good, bright finish, were the bonus features this food processor got by specifying Carpenter Stainless Tubing, Type 304.

When this mass production assembly for holding "ice cream on sticks" was developed, the job called for "Type 304 Stainless Tubing" to meet sanitary requirements.

But problems in swaging and flaring the tube ends almost licked the idea. Then the specification was changed to "Carpenter *Type 304 Stainless Tubing" and fabricating problems disappeared.*

When you need the sanitary advantages of Stainless Tubing, plus easy fabrication because of uniformity in finish, tolerance and analysis, it will pay you to get in touch with Carpenter or your nearest Carpenter Stainless Tubing Distributor.

NEW SLIDE CHART ON BENDING STAINLESS TUBING

This new Carpenter service can help you conserve material, get best results with Stainless Tubing and Pipe. Covers bending radii, coil diameters for various sizes and gauges. A note on your company letterhead will bring you the new Carpenter Tubing Slide Chart.

THE CARPENTER STEEL COMPANY

Alloy Tube Division, Union, N. J.

Export Department: The Carpenter Steel Co., Reading, Pa. "CARSTEELCO"

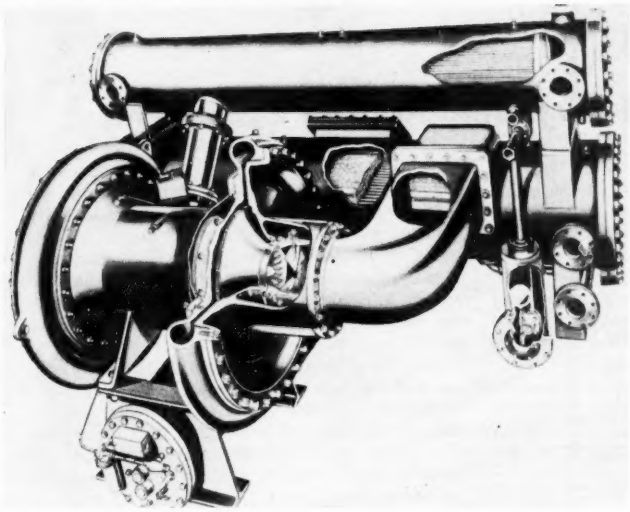
Carpenter

STAINLESS TUBING

Analysis · Tolerance · Finish

—guaranteed on every shipment

Stocked by Distributors in Most Major Cities



Centrifugal Compressor Aims at Reduced Costs

Lower operating, maintenance, and installation costs in industrial air conditioning systems are claimed for the new CenTraVac centrifugal refrigerating unit. Advantages of centrifugal design, hermetic sealing, and variable capacity are reported combined.

Maintenance economy is credited to the hermetic-seal design of the two-stage compressor-motor assembly. Shaft seals are eliminated.

Vibration-free operation is stated to be gained through direct drive, eliminating gear boxes. This enables installation on any floor that will support its dead weight.

Operating economy, says maker, is obtained with the capacity control or "unloading" system, composed of variable vanes in the inlets of both low and high temperature compression stages. There is an almost constant ratio between cooling demand and power consumption through the normal operating range, thus providing a high degree of operating efficiency.

Unit can be controlled by pushbutton or thermostatically. Covering the general range of 40 to 52 deg. F., the five different units have capacities ranging from 45 to 190 tons.—*The Trane Co., La Crosse, Wis.*

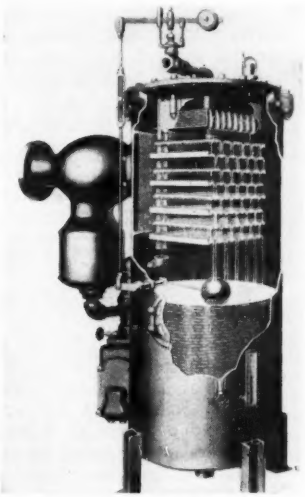
Side Register Control For Packaging Units

An electronic side register control reported to maintain automatically and accurately, the lateral position of a moving web of material on slitting, re-winding, and other packaging machines has been announced.

Maker states it will respond to a signal from a printed line on paper, plastic or cloth of 1/32 in. minimum width. It ignores all signals from printing adjacent to the guide line on the trailing edge of the scanning sweep. The control follows broken lines of the same width, and will not change web position if the web breaks. Instantaneous response for errors smaller than .001 in. is reported.

A rotary lens web scanner and a thyratron control panel comprise the control. Direction of scanning can be selected by a panel-mounted switch, and red and blue sensitive phototubes will handle most color contrasts.

The thyratron reversing motor control feeds power to the correction motor so that correction is proportional to the amount of error detected by the web scanner.—*General Electric Co., Schenectady 5, N. Y.*



Small Feed-Water Heater Uses Exhaust Steam

Announced is a new feed-water heater designed specifically for dairies and other small processing plants with boiler capacities that are rated at 300 hp. or less.

Known as the Junior, the unit utilizes exhaust steam to heat water before it is delivered to boiler. Made of fabricated steel, heater has special stainless steel trays that disperse feed water in the form of thin curtains over a large area. Thus, the exhaust steam gives up its heat quickly and evenly. Maker claims a saving of 1 percent in fuel will result from each 11 deg. F. increase in feed water temperature through the use of exhaust steam.

Ample water storage space eliminates the necessity for a sump or hot well. Condensate returns are piped to heater for quick reheating to near boiling point.

Unit is delivered complete, with all accessories ready to install.—*The Swartwout Co.*, 1851 *Euclid Avenue, Cleveland* 12.

In Behalf of Progress . . .

How to Get Special DO Rating for New Equipment

Our industry is in the midst of one of the most competitive situations it has faced—the scramble for materials. In this fight, food processors are not just competing with each other. They are pitted against other industries.

Food equipment requires large quantities of the scarce metals—steel, copper, aluminum, tin and stainless steel. More, it takes parts and accessories that are in tight supply—castings, forgings, motors and controls. Stainless steel presents the worst problem because of the critical shortage of nickel.

As long ago as February 7, dairy equipment representatives reported a five- to six-month order backlog. And they were concerned lest they face a production shutdown on bottle fillers, pasteurizers, tanks, weigh cans, homogenizers, filters, pumps and other processing equipment.

Manufacturers of canning and other food machinery are having their troubles, too. Many of them put it this way: "While we still are able to obtain materials and parts, the situation is very tight and procurement has become most complicated and worrisome."

Pending a Controlled Materials Plan, priority ratings are extended only for defense procurement and to meet the most critical civilian needs. Expenditures for maintenance, repair and operating supplies and equipment that involve scarce metals may equal those for 1950. Any minor capital addition is limited to $750. Here NPA has authorized industry itself to use a DO rating.

Construction or equipment programs which exceed $750 must be authorized by NPA and be awarded a special DO rating. To obtain such a rating, you must prove not only that your case involves "extreme hardship," but that your business is essential. True, Washington knows that food processing is essential as an industry. But various branches are finding it necessary to prove their essentiality.

Here, a three-way approach is advisable: Show that your business is necessary to farmers, consumers, and the armed forces. Then throw in any international angles for good measure.

Operation Priority is detailed elsewhere in this issue. And here are some helpful priority hints:

First, write to the appropriate section chief in the Office of Materials & Facilities, and give him complete information to avoid additional letters and loss of time. Then telephone to ascertain the name of the Industrial Specialist to whom your inquiry is assigned, and ask this individual whether further information is required.

If essentiality has not been recognized in the higher echelons of Agriculture and NPA, get your trade association and other groups at work on this problem. Also, make certain that the Industrial Specialist is obtaining information on essentiality from all possible sources in Agriculture. And it even may be necessary to present information to friendly Congressmen with the request that top men in Agriculture and NPA recognize—in writing—the essentiality of your branch of the industry.

Armed with purchase orders for the equipment and materials needed, with proof that a particular DO Rating is necessary, and with evidence that the industry to be served is essential, go to Washington. There, confer with the appropriate Industrial Specialist in Agriculture and have him prepare the GA-3 application for a DO Rating. Be ready to spend several days in Washington to obtain a letter of recommendation from Agriculture and a letter of transmittal to NPA.

With this part of your mission completed, go home. Then wait for assignment of the application to an Industrial Specialist in NPA. But if nothing happens soon, telephone your Industrial Specialist contact in Agriculture and remind him to follow through on your application until it is finally assigned. Many important documents get misplaced, and constant vigilance is necessary.

When the assignment is made, ask the NPA Industrial Specialist if the application is in order, if further data are needed, and if he will give the application favorable recommendation.

By this time it may be necessary to go to Washington again to get the final rating assigned. At this pay-off stage, be ready to call in Congressional assistance if necessary to push the application to a successful conclusion.

The priority situation is complicated by the fact that NPA is set up at present to provide only ratings on specific purchase orders for specific materials. No industry ratings will be given until CMP goes into effect, sometime after July 1. Going to Washington without specific purchase orders will be a waste of time and money.

Too much stress cannot be placed upon the need for obtaining a letter from the Secretary of Agriculture establishing the essentiality of your branch of the industry. Such a letter will save the time lost in working up letters of recommendation from commodity branches in Agriculture, without which no priorities will be given.

Obviously, Operation Priority becomes Operation Headache before you go very far.

—FRANK K. LAWLER, *Editor*

MILK

Batch—2,000 gallon tank truck.

Operation—Stirring to insure uniformity before dumping or sampling.

Mixer—LIGHTNIN S-2, ½ H.P. portable mixer, direct drive, totally enclosed motor, stainless steel shaft, propellers, tube and chuck.

CATSUP

Batch—300 gallon open tank.

Operation—Stirring while cooking, to prevent burning.

Mixer—LIGHTNIN D-2, ½ H.P. portable mixer, gear drive, with totally enclosed motor, stainless steel shaft and propellers. Stainless steel tube and chuck; bronze housing.

LARD

Batch—1,000 gallon open tank.

Operation—Rendering or blending batches.

Mixer—LIGHTNIN D-3, 1 H.P. portable mixer, gear drive, with totally enclosed motor, stainless steel shaft and propellers.

EXTRACTS *(water base)*

Batch—100 gallon open tank.

Operation—Simple blending.

Mixer—LIGHTNIN C-4, ¼ H.P. portable mixer, direct drive, with semi-enclosed motor, stainless steel shaft and propellers.

Modifications—With alcohol use explosion-proof motor.

MAYONNAISE

Batch—200 gallon closed tank.

Operation—Premixing ingredients before going to colloid mill for high uniformity.

Mixer—LIGHTNIN 33G-50, ½ H.P. nozzle mounted mixer. Gear drive, with totally enclosed motor, stainless steel shaft and propellers.

MILK *(Pasteurizing)*

Batch—100 to 150 gallons—open tank.

Operation—Stirring while heating.

Mixer—LIGHTNIN LDG-25, ¼ H.P. permanently mounted mixer, gear drive, with totally enclosed motor, stainless steel shaft and propellers.

SALT BRINE *(canning)*

Batch—500 gallon open tank.

Operation—Dissolving salt in water.

Mixer—LIGHTNIN S-3, ¾ H.P. portable mixer, direct drive, with totally enclosed motor, monel shaft and propellers. Monel tube and chuck. Bronze housing.

MUSTARD

Batch—600 gallon open tank.

Operation—Mixing vinegar, water and essential spice oils. Dissolving salt in the mix. Keeping mustard seed in uniform suspension while drawing-off to colloid mill.

Mixer—LIGHTNIN D-3 1 H.P. portable mixer, gear drive, with totally enclosed motor. Stainless steel shaft, propellers, tube and chuck.

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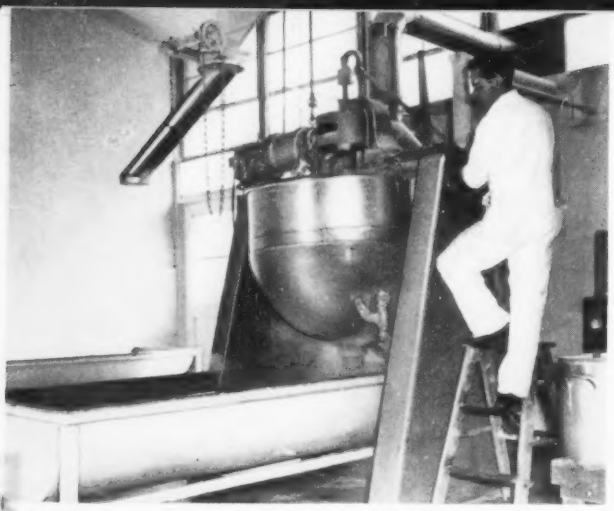
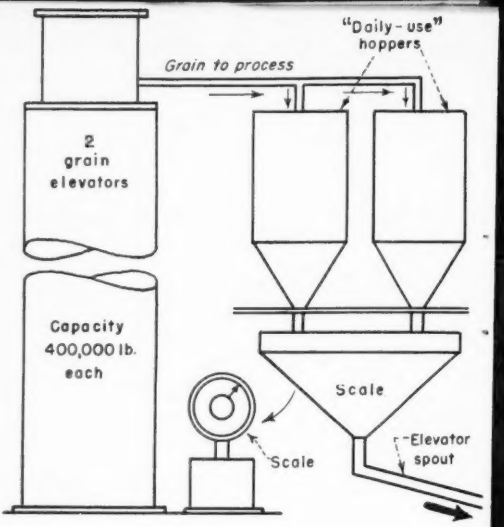




1 **STEAM-JACKETED** kettle receives corn from "daily hopper" spout (left). Here, operator is emptying cooked batch.

How Fritos and Cheetos Are Made

Popular Corn and Cheese Tidbits Come Off Carefully Coordinated Lines

USE OF MODERN, sanitary, and efficient equipment and methods marks the production of Fritos and Cheetos in the new Frito Co., plant in Los Angeles.

Production steps in the process are depicted in the accompanying foldout flowsheet. Keyed photos illustrate the operations.

Corn is received at the plant in bulk form in rail cars and transferred to one of two grain elevators. After a thorough cleaning process, it is conveyed to a "daily use" hopper and then travels by gravity to the weighing hopper. When the proper amount (450 lb.) is in the weigh hopper, the batch is automatically dumped into the steam jacketed kettle—Point 1 in diagram. A mild solution of water and lime is added, then cooking proceeds at 212 deg. F.

The batch of precooked corn and steep-water is next run into soaking vats, remaining there for several hours. Soaked corn is transfered to a stainless steel washer, where an auger moves it through a perforated stainless steel cylinder and where high-pressure water sprays remove the steep water, loose hulls, and any extraneous matter.

From the washer drain-tank, corn is fed to the grinder. Here, the corn passes between two rotating lava-stones and is reduced to a dough. Called "masa", this dough is then hand-molded into cylindrical shaped loaves and fed to the automatic extrusion press—Point 4. Featuring two cylinders that alternately feed to the extrusion head, this hydraulic press provides a continuous flow of product to the cooker.

Vegetable oil in the enclosed cooker is maintained at a constant temperature by an automatic controller. A motor-powered wheel-paddle keeps the oil in the cooker in motion. Product enters at one end and moves with the flow of oil through the cooker.

A measured flow of oil is continually added to replace that absorbed by the product. At the other end of the cooker, the product is removed by a stainless steel conveyor and remains on this mover long enough to drain.

While on this conveyor, the tidbits are automatically salted, then they pass to a vibrating conveyor—Point 5. Operated on an incline, this 65 ft.-long conveyor is comprised of two overlapping levels. Fritos are first carried on the upper level to a gate just ahead of the Cheetos feed line. Here, Fritos are dropped to the lower level of the now-dual conveyor.

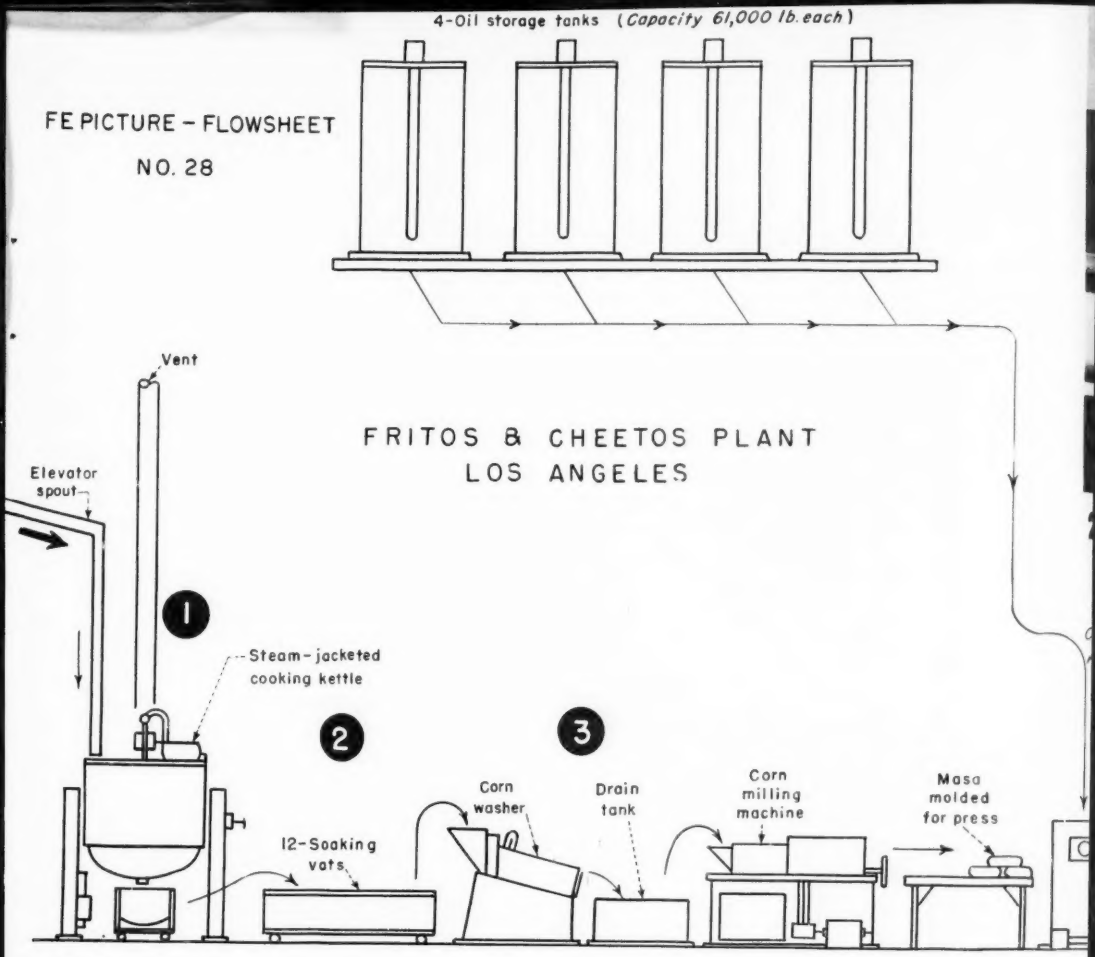
Ready for packaging, Fritos pass from the vibrating conveyor to a metering feed hopper that provides a uniform flow of product to a secondary vibrating conveyor. Sliding trap doors in this latter conveyor are automatically operated by action of scales. When the proper weight has been reached, the trap door closes and simultaneously the product is blown from the scale pan by compressed air into a bag-filling plastic cylinder. There are twelve cylinders mounted on the filling turn-table, which rotates counter-clockwise in synchronization with the action of the scales.

An operator attaches a bag to a cylinder, and after filling, the bag automatically drops to another vibrating conveyor that shakes down the contents while delivering bags to the heat sealer.

Behind the Lines You See Here

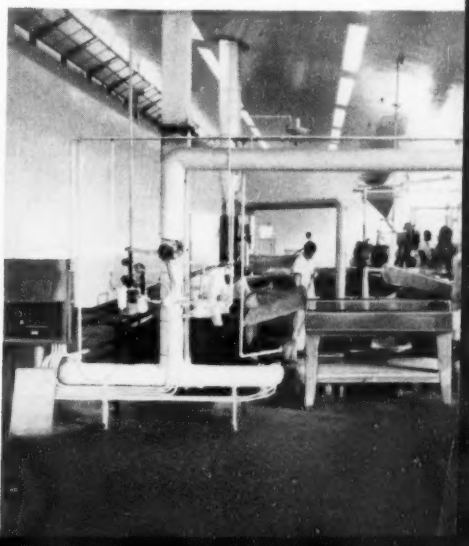
—is a salient story of a food company's remarkable growth, sparked by foresighted management principles. It's told in the special feature article, "From Scratch—to $15,000,000", on page 102.

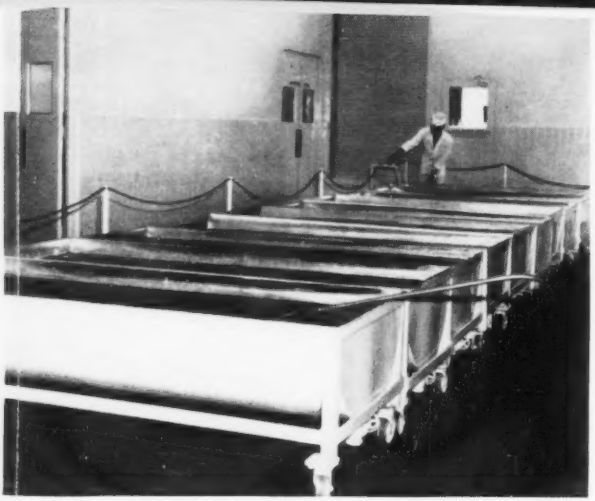
FE PICTURE – FLOWSHEET
NO. 28



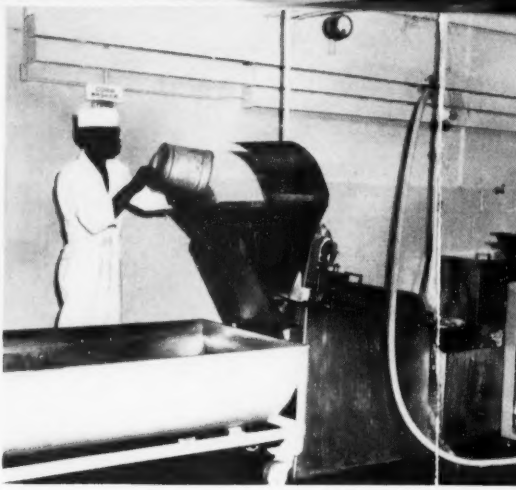
5 **DUAL** conveyor carries Fritos (foreground) and Cheetos (background). Fritos drop to lower level (center).

6 **ALL MACHINES** are regularly dismantled, then clean and detergent. Floor is steam cleaned, scrubbed. Che

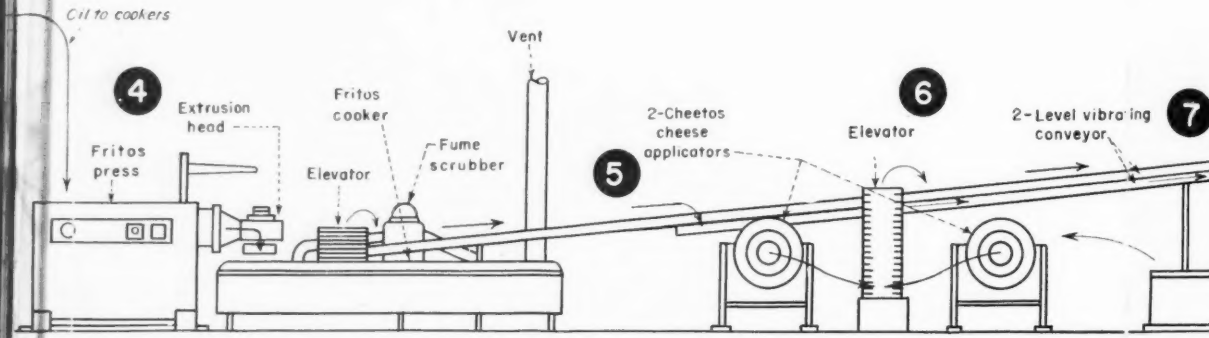




2 **PRE-COOKED CORN** and steep water remain in these soaking vats for several hours. Time element is set by laboratory test.



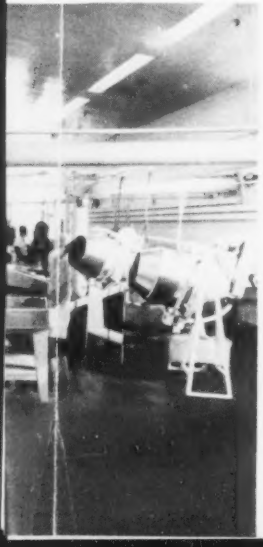
3 **SOAKED CORN** is transferred from vat to stainless steel wa From washer's drain-tank, corn then moves to grinder (ex

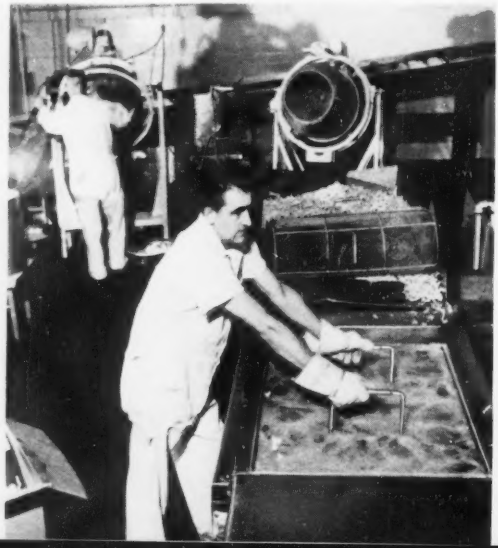


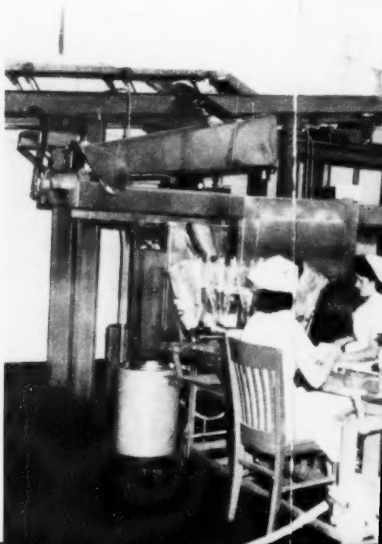
cleansed with steam, hot water l. Cheetos units are seen.

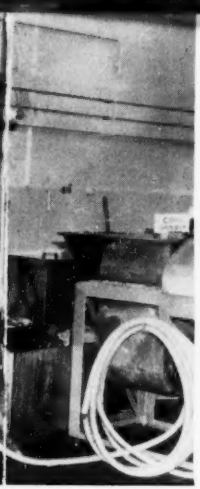
7 **IN DEEP FRYER,** Cheetos are cooked in pure vegetable oil. Cheese is added in revolving drums (rear).

8 **OPERATOR** (rear) places bags on filling cyl scale pan into cylinder. Unit (right) automa

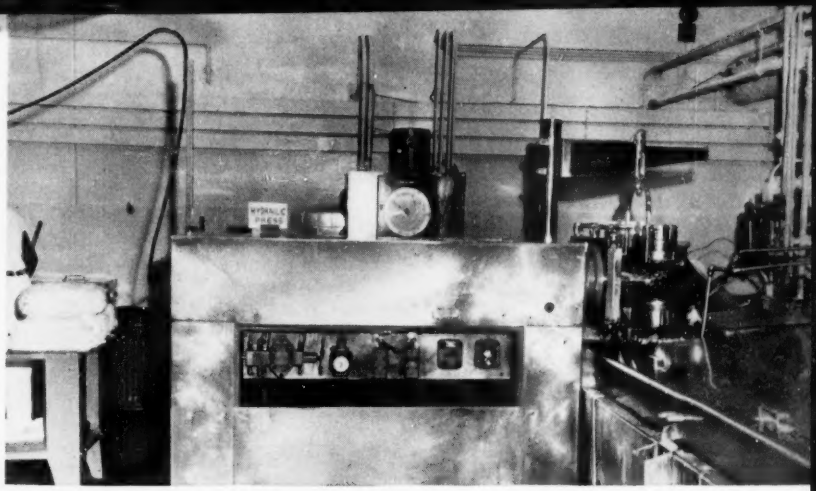




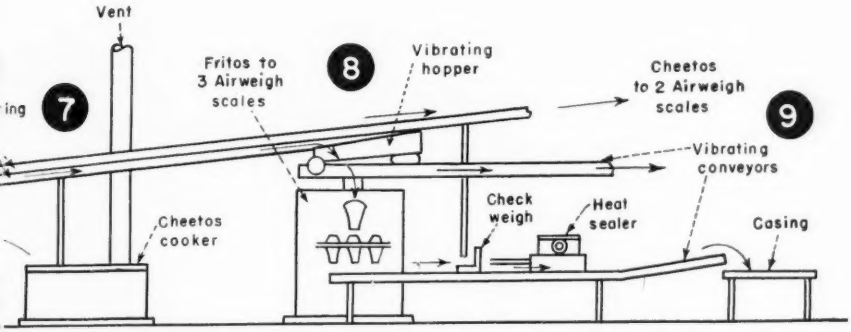




ss steel washer (center).
rinder (extreme right).

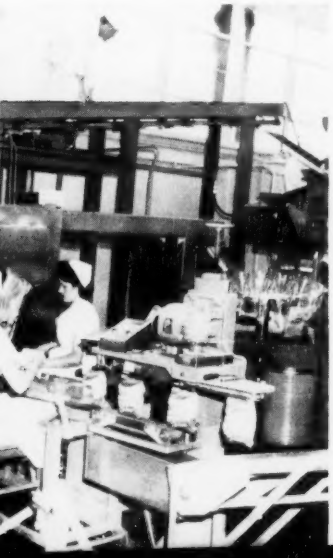


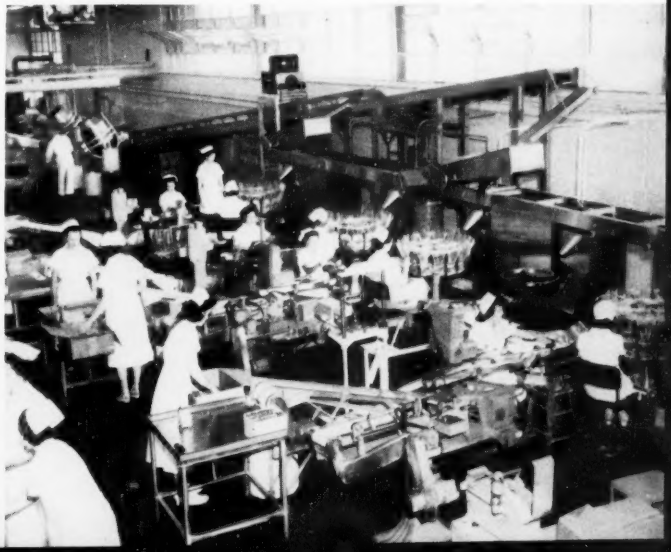
4 **DOUGH,** in hand-molded loaves called "Masa," is fed from table (left) into hydraulic press (center), which extrudes it in ribbon form to cooker (right).

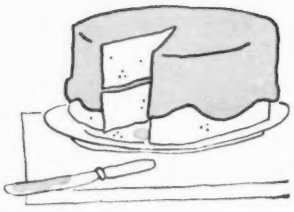


ı filling cylinders. Product is blown from
ht) automatically heat seals bags.

9 **OVERALL** view of packaging and casing shows (rear) two-level conveyor moving products to fillers. Cheetos are being packed in foreground.







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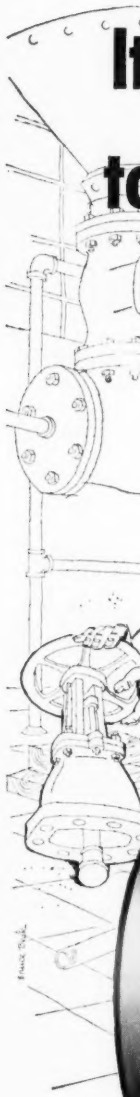

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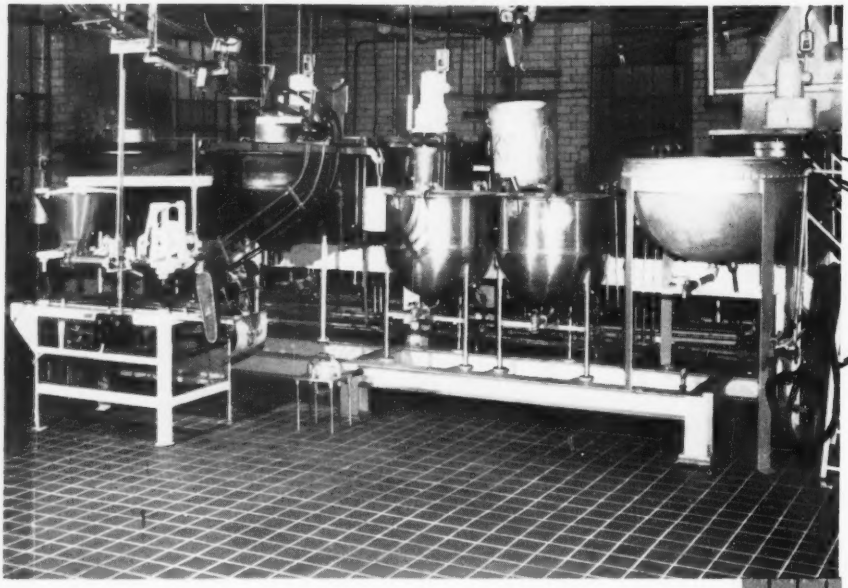
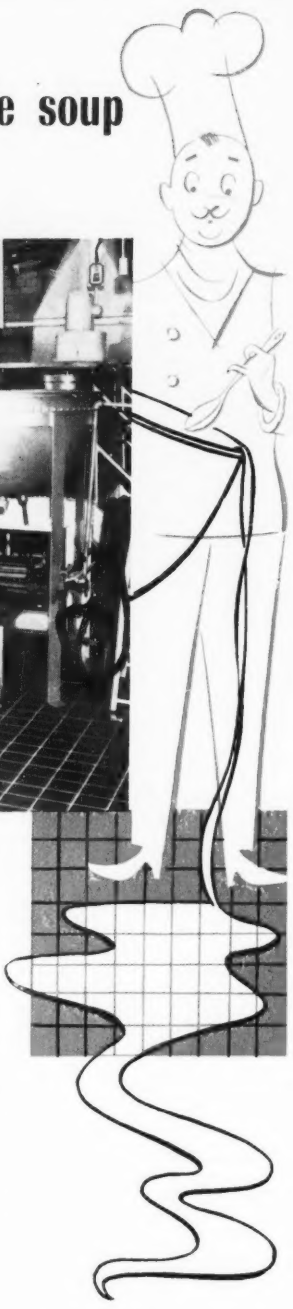
Mosaic Carlyle Quarry Tile floor in Stegner Food Products Company plant, Cincinnati, Ohio





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TO OBTAIN commercial fungal-enzyme preparations for supplementing doughs, stock cultures of **Aspergillus oryzae** (above) must be inoculated in trays containing sterilized bran media. The cultures produce amylolytic and proteolytic enzymes needed to liquefy starch and to split proteins. These changes are desirable, particularly in getting more vigorous fermentation and in improving loaf characteristics of bread through modification of large starch and protein molecules. (Photo courtesy Takamine Laboratory, Inc.)

FUNGAL ENZYMES

Help You Make Better Bread

CONCLUDING PART II

Today, mold supplements are available with any desired ratio of proteinase to alpha-amylase—giving bakers new control over doughs prior to make-up

JOHN A. JOHNSON and BYRON S. MILLER

Associate Professors, Department of Milling Industry, Kansas State College. Latter is also Associate Chemist, Bureau of Plant Industry, Soils & Agriculture Engineering, USDA, Manhattan, Kansas

The advantage of incorporating fungal-enzymes, rather than malted wheat-flour, as supplements in dough is that the amylolytic and proteolytic activity can be conveniently varied to any desired level.

Moreover, fungal enzymes enable utilization of wheats heretofore considered inferior for milling into flour for bread-making.

Information on the enzymes involved in supplementation—what they do, and methods for measuring alpha-amylase and proteolytic activity—was presented in Part I of this article (p. 80, Mar. FI).

Now, we go onto such fungal-enzyme considerations as straight dough vs. sponge baking, stability of the starch-liquefying enzyme alpha-amylase and the protein-splitting enzyme proteinase, modification of dough properties by enzyme supplementation, effect of fungal enzymes on bread quality, and flours' response to supplements.

Commercial bread is generally produced using a sponge procedure in which up to 70 percent of the flour, yeast, malt supplement, and a proportionate amount of water are mixed and allowed to ferment before mixing the rest of the flour and remaining ingredients. In the laboratory, a straight-dough baking procedure is frequently employed in which all of the ingredients are mixed at the same time.

Although small amounts of enzymic supplements are beneficial in both baking formulas, detrimental effects of excessive dosages frequently have been

encountered, and bakers are, therefore, reluctant to use more than a very small percentage—usually 0.25 to 0.50 percent of malted wheat flour or its equivalent.

There are two conflicting theories on the cause of this detrimental action. One postulates that the detrimental action is due to proteolytic enzymes present in the malt. The other theory suggests that increase in dough mobility and stickness is actually to be attributed to excessive alpha-amylase activity.

Read and Haas[9] noted that the action of certain enzyme preparations was more marked with the sponge method than the straight dough baking procedure. Johnson and Miller[10] showed that high levels of alpha-amylase may be used in straight doughs without serious detrimental effects. Comparative data based on the use of both straight dough and sponge procedures are presented in Table VI.

Increasing concentrations of either wheat malt or fungal alpha-amylase, up to 24 times the normal amount*, caused improved loaf volume and crumb characteristics when the straight dough procedure was employed. The grain and texture and crumb color, however, were inferior when the malted wheat flour was used at 24 times the normal concentration.

Use of equivalent quantities of fungal and wheat malt alpha-amylase in the sponge procedure revealed a sharp decline in loaf volume and crumb characteristics with increasing levels of fungal alpha-amylase. The mixing time also was reduced and the dough became soft and sticky.

In contrast to this, the bread quality steadily improved with equivalent quantities of wheat malt alpha-amylase up to twelve times the normal amount. This difference in the action of the two supplements may be explained by the fact that the fungal preparation had eight times as much proteolytic activity as did an amount of malted wheat flour with equivalent alpha-amylase activity.

When a large portion of the proteolytic activity was removed from the extract of fungal amylase, the baking results were similar to those when malted wheat flour was used. An increase in loaf volume and an improvement in crumb properties were then obtained with increasing concentrations of the fungal amylase extract.

These data clearly demonstrate the marked difference in the effect of proteolytic enzymes in the straight dough and the sponge-baking procedures. Extracts having excessive proteolytic activity are undesirable as baking adjuncts in the sponge procedure because of their effect on "gas retention capacity" and because of their detrimental effect on physical dough properties.

Since only yeast and water are normally introduced to the sponge, it was assumed that one or more of the baking ingredients added at the dough stage (straight-dough procedure) prevented the appearance of the detrimental properties observed in the sponge. Beneficial effects of adding sodium chloride to the sponge are shown by baking data in Table VII.

With respect to proteolytic activity,

* Normal malt supplementation is here taken as equivalent to 0.25 percent malted wheat flour, based on the weight of flour in the formula.

Charts and Tables Show Effects of Supplementation

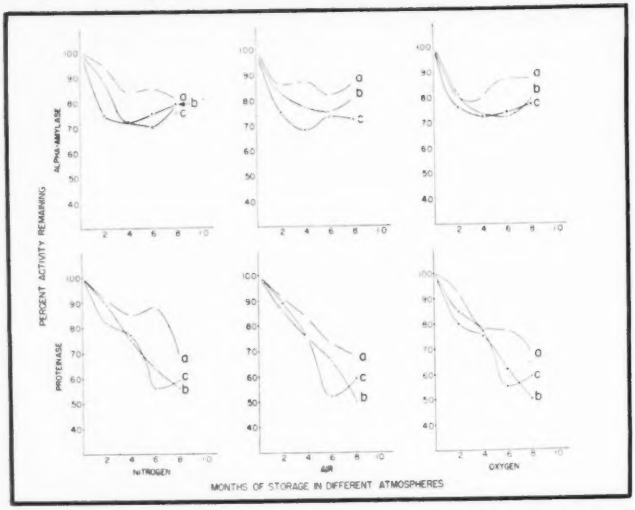

FIG. 1. FLOURS supplemented with fungal-enzyme concentrate retained highest alpha-amylase and proteinase activity at lowest storage temperature, regardless of type of gaseous atmosphere and storage period. Legend: **a** denotes 41 deg. F.; **b**, room temperature; and **c**, 95 deg. F. (Data of Conn, Johnson, and Miller, ref. Table VIII)

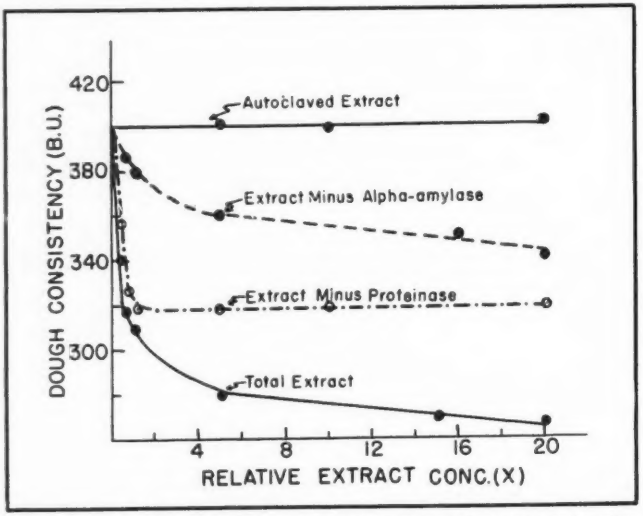

FIG. 2. DOUGH CONSISTENCY, expressed in Brabender farinograph units, shows effect of supplementation with total of untreated malted wheat flour extract and with extracts separately treated to inactivate alpha-amylase, proteinase, and all other enzymes. Untreated extract had greatest softening effect. (Data of Johnson and Miller, ref. Table X)

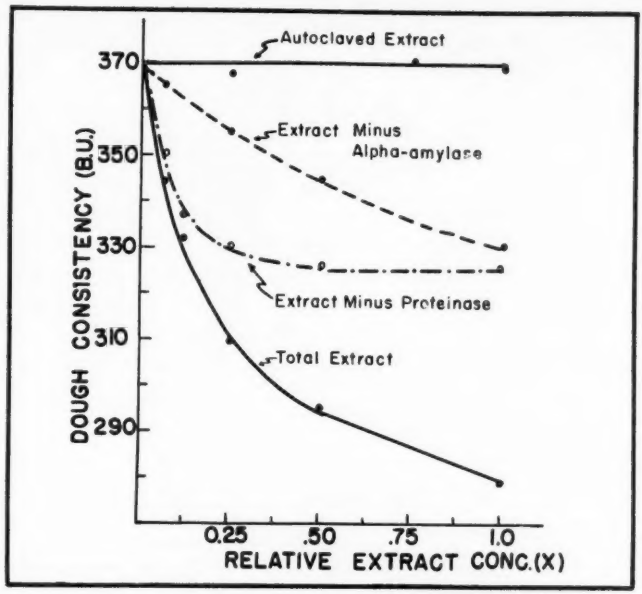

FIG. 3. NORMAL UNTREATED fungal-extract supplementation had greatest softening effect on dough consistency (measured in Brabender farinograph units) when compared with fungal extracts treated separately to inactivate alpha-amylase, proteinase, and all other enzymes. (Data of Johnson and Miller, ref. Table X)

TABLE VI*—COMPARISON of Straight and Sponge Dough Baking Procedures Employing Various Malted Wheat Flour and Fungal Alpha-Amylase Levels**

Source of Alpha-Amylase	Relative*** Enzyme Concentration	Loaf Characteristics: Loaf Volume (ml.)	Grain (Percent)	Texture (Percent)	Break & Shred
Straight-Dough Procedure					
Wheat malt	0	750	85–o	90	Very good
Wheat malt	1X	755	85–o	90	Very good
Wheat malt	12X	825	88–o	93	Very good
Wheat malt	24X	825	89–o	93	Very good
Fungal	1X	720	85–c	86	Good
Fungal	12X	850	90–o	90	Very good
Fungal	24X	870	93–c	95	Good
Sponge-Dough Procedure					
Wheat malt	0	685	87–c	85	Fair
Wheat malt	1X	710	91–c	90	Good
Wheat malt	12X	760	85–c	85	Good
Wheat malt	24X	810	83–o	84	Fair
Fungal	1X	720	90–c	87	Good
Fungal	12X	675	75–o	70	Poor
Fungal	24X	580	50–o	50	Poor

* Tables I to V appeared in March issue of F. I.
** Miller, B. S., and Johnson, J. A. "High Levels of Alpha-Amylase in Baking. II. Proteolysis in Straight and Sponge Doughs." *Cereal Chem.*, 25, 178–190, 1948.
*** 1X—Normal concentration of alpha-amylase equivalent to that provided by 0.250g. of malted wheat flour per 100g. of flour.
c Means close and o Means open.

TABLE VII—HOW Sodium Chloride Affects Sponge Doughs Containing High Levels of Fungal Alpha-Amylase*

Relative Enzyme** Concentration	NaCl Added to Sponge (g.)	NaCl Added to Dough (g.)	Dough Mixing Time (Min.)	Volume (ml.)	Grain (Percent)	Texture (Percent)	Break & Shred	Dough Handling at Pan
0	0	1.5	2.00	705	80–o	85	Fair	Good
1X	0	1.5	2.00	780	88–o	90	Good	Good
12X	0	1.5	1.00	745	75–o	85	Poor	Slightly soft
24X	0	1.5	0.25	610	60–o	70	Very poor	Very soft
0	1.5	0.0	2.00	770	82–o	85	Good	Good
1X	1.5	0.0	2.00	785	86–o	88	Good	Good
12X	1.5	0.0	2.00	850	86–o	90	Fair	Good
24X	1.5	0.0	1.75	860	83–o	88	Fair	Good

* Data of Miller and Johnson (ref. Table VI).
** 1X—Normal concentration of alpha-amylase equivalent to that provided by 0.250g. of malted wheat flour per 100g. of flour.
o Means open.

(*Tables Continued on page* 165)

addition of sodium chloride to the sponge tended to equalize the two baking procedures. The deleterious effect of large fungal-amylase additions on loaf volume, handling, and crumb characteristics was counteracted by the introduction of salt to the sponge. Inhibition of fungal-proteolytic enzymes by sodium chloride, as determined by chemical means, was found to be approximately 55 percent under conditions similar to those found in the sponge. Chemical data, therefore, support the evidence provided by actual baking tests that sodium chloride partially inhibits proteolytic enzymes.

Proteinase and Alpha-Amylase Stability

Effects of storage on retention of alpha-amylase and proteinase activity of flours, kept under oxygen, nitrogen, and air atmospheres at three different temperatures, are shown in Fig. 1. The analyses of variance of these data are presented in Table VIII. Significant differences in both alpha-amylase and proteinase (as affected by temperature and length of storage) were observed. The lower storage temperature was favorable to the retention of both alpha-amylase and proteinase, and the effect of storage under various gases was similar. It was observed that the largest decreases in alpha-amylase activity occurred during the first two months of storage. Loss of proteolytic activity was more marked and consistent with time than amylase activity.

Dough Properties Modified

It has been previously pointed out that the two important enzyme components of supplements being considered are alpha-amylase and proteinase.

To study the effect of alpha-amylase and proteinase from fungal and malted wheat sources, extracts were prepared from which the components were differentially inactivated. The extracts, so prepared and a standardized for potency, were added to a sponge dough in appropriate concentrations. After 4 hrs. of sponge fermentation, the dough consistency was measured on a Brabender farinograph. Results of these studies are shown in Fig. 2 and 3.

It is evident from these figures that both alpha-amylase and proteinase are responsible for changes in dough mobility during fermentation. Extracts from which both enzymes had been removed showed no increase in dough mobility with increasing amounts of the extract. Those extracts containing alpha-amylase increased the dough mobility at extremely low enzyme concentrations. And with higher concentrations, there was no further change in dough mobility. This limited softening action was associated with the fact that only a small percentage of starch was available for alpha-amylase.

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Further Data on Supplementation Effects

TABLE VIII—ANALYSES of Variance in Effect of Temperature and Gaseous Atmosphere Upon Retention of Alpha-Amylase and Proteinase Activity During Storage*

Source of Variation	Degrees of Freedom	Mean Square	
		Alpha-Amylase Activities	Proteinase Activities
Atmosphere	2	5	19
Temperature	2	315-s	413-s
Length of storage	4	857-s	2752-s
Atmosphere x temperature	4	7	9
Atmosphere x length of storage	8	10	6
Temperature x length of storage	8	29	76-s
Atmosphere x length of storage x temperature	16	8	13
Total	44		

* Conn, J. F., Johnson, J. A., and Miller, B. S. "An Investigation of Commercial Fungal and Bacterial Alpha-Amylase Preparation in Baking." *Cereal Chem.*, 27, 191–205, 1950.
s Means significant at the 1 percent level.

TABLE IX—BAKING DATA Indicate Separate Effects of Alpha-Amylase and Proteinase Supplementation*

Relative** Alpha-Amylase Concentration	Relative*** Proteinase Concentration	Grain (Percent)	Texture (Percent)	Loaf Volume (cc.)	Dough Properties
Hard Red Winter Flour					
0	0	75	80	2916	Satisfactory
0	1Y	80	78	2981	Satisfactory
0	4Y	85	80	2988	Slightly slack
1X	0	90	88	3059	Satisfactory
1X	1Y	90	88	3041	Slightly slack
1X	4Y	88	85	2959	Slack
8X	0	90	90	3062	Satisfactory
8X	1Y	88	90	3066	Slightly slack
8X	4Y	85	87	3056	Slack
Hard Red Spring Flour					
0	0	75	80	2788	Bucky
0	1Y	77	82	2738	Slightly bucky
0	4Y	77	82	2869	Satisfactory
1X	0	80	85	2757	Slightly bucky
1X	1Y	85	87	2975	Satisfactory
1X	4Y	92	90	2994	Satisfactory
8X	0	80	87	2888	Satisfactory
8X	1Y	92	90	2953	Slightly slack
8X	4Y	92	90	2959	Slightly slack

*Data of Conn, Johnson and Miller (ref. Table VIII).
**1X-concentration of alpha-amylase equivalent to alpha-amylase provided by 0.25 percent malted wheat flour supplementation.
***1Y-addition to 100g. of flour of that amount of proteinase which would give a titration of 1ml. in a proteolytic-activity determination. (Reference: Miller, B. S. "A Critical Study of the Modified Ayre-Anderson Method for the Determination of Proteolytic Activity." *J. Assoc. Off. Agr. Chem.*, 30, 659–669, 1947.)

TABLE X—HOW Alpha-Amylase and Proteinase From Fungal Sources Affect Bread Quality*

Relative** Concentration	Loaf Volume (cc.)	Grain (Percent)	Texture (Percent)	Firmness of Crumb**** (g.)
Control				
0	2690	80	80	147
1X	2730	80	85	125
5X	2816	90	95	111
20X	2672	60	70	125
Supplement Minus Proteinase				
1X	2759	75	75	105
5X	2813	80	85	106
20X	2894	75	75	105
Supplement Minus Alpha-Amylase				
1X***	2738	80	85	116
5X	2622	75	80	122
20X	2475	60	60	127

*Johnson, John A., and Miller, Byron S. "Studies on the Role of Alpha-Amylase and Proteinase in Breadmaking." *Cereal Chem.*, 26, 371–383, 1949.
**1X-concentration is equivalent to 0.25 percent malted wheat flour having an activity of 42.8 alpha-amylase units per gram.
*** Concentration of proteinase adjusted to be equivalent to control.
****Grams of lead shot required to depress plunger of 1 in. dia. into crumb a distance of 4 mm. Bread stored 66 hr.

(*Tables Continued on page* 167)

Extracts that contained proteinase caused a steady increase in mobility with higher concentrations. The extracts containing both alpha-amylase and proteinase produced a curve which was essentially the summation of the observed action of alpha-amylase and proteinase when used singly.

The two enzyme supplements used in this study were known to have different ratios of alpha-amylase to proteinase. The fungal-enzyme supplement (Fig. 3), as shown by chemical analysis, possessed approximately 20 times more proteinase activity per alpha-amylase unit than did the malted wheat flour (Fig. 2). These figures (2 and 3) show that the dough softening properties of the two alpha-amylases were about equal. However, the dough-softening effect of the proteinase in the fungal source, when compared on equivalent alpha-amylase unitage, was approximately 20 times more potent than that of the malted wheat flour extract.

■ **Since fungal-enzyme supplements can now be prepared with any ratio of proteinase to alpha-amylase by control of culture practices or precipitation procedures, a new and interesting feature of controlled supplementation is provided in the field of baking. It is possible that this feature will bring new means to the baking industry for control of the condition of the doughs before putting them through make-up machinery. It should be possible to modify extremely tough and "bucky" doughs so that a high quality product can be obtained.**

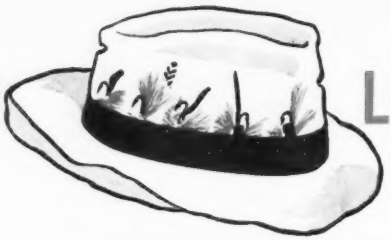
Recent methods[11] of differentially separating alpha-amylase and proteinase from supplements, and the availability of fungal enzyme sources having various ratios of alpha-amylase and proteinase, make possible a study of variation in requirement of flours for enzyme supplementation in baking.

Several experiments with various flours were made using a commercial sponge procedure. In one experiment, two flours were selected because of different properties. One represented a hard red winter wheat flour known to produce a dough with mellow properties. The other represented a hard red spring wheat, and it was characterized as producing a slightly "bucky" dough under normal baking conditions.

Two fungal enzyme supplements were then prepared—one practically free of proteinase and the other practically free of alpha-amylase. Varying proportions of these supplements were added to the sponges. Results are summarized in Table IX.

Both external and internal characteristics of the bread produced from the hard red winter wheat flour, as well as the dough-handling properties, indicated that no proteinase was required for producing optimum quality bread. Top quality bread was obtained with the hard red spring wheat flour, using 1 to 4Y concentration of proteinase. As far as alpha-amylase supplementation was concerned, the amount was not critical. An adequate level was considered any amount above IX.

Characteristic results for a hard red spring wheat flour are shown in Table X. By increasing the combined alpha-amylase and proteinase up to 5X concentration, the loaf volume, grain, and texture were improved, and thus the crumb became softer. At the highest concentration, 20X, the deleterious effect on the bread quality was evident. The series from which the proteinase was removed exhibited an improvement in loaf volume, even at a 20X alpha-amylase concentration. The grain and texture improved up to a 5X concentration, but not to the extent observed when both alpha-amylase and proteinase were present. The bread baked with only proteinase present was improved at low concentrations, but the effects of this enzyme at high concen-

WHY SO MANY  LURES?

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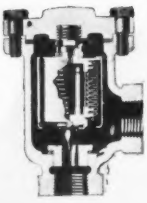

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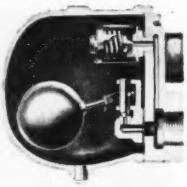

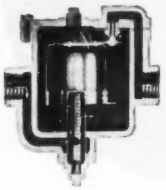

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TABLE XI—EFFECT of Fungal Alpha-Amylase and Proteinase Supplementation on Bread-Crumb Compressibility*

Alpha-Amylase** (Concentration)	Proteinase*** (Concentration)	Compressibility of Bread Stored**** 24 Hr. (g.)	96 Hr. (g.)
0	0	100.4	152.0
0	1Y	95.1	149.3
0	4Y	85.8	144.4
1X	0	83.9	131.6
1X	1Y	82.3	125.3
1X	4Y	74.6	120.5
8X	0	82.2	126.6
8X	1Y	75.8	120.4
8X	4Y	71.0	118.7

Source of Variation	Analysis of Variance Degrees of Freedom	Mean Square
Proteinase	2	1,926-s
Alpha-Amylase	2	9,988-s
Storage	1	127,653-s
Proteinase x alpha-amylase	4	26
Proteinase x storage	2	57
Alpha-amylase x storage	2	517-s
Proteinase x alpha-amylase x storage	4	35
Individual values	198	119
Total	215	

*Data of Conn, Johnson, and Miller (ref. Table VIII).
**1X—Concentration of alpha-amylase equivalent to the same enzyme provided by 0.25 percent malted wheat flour supplementation.
***1Y-concentration, the addition to 100g. of flour of that amount of Diastase-29 proteinase which would give a delta titration of 1 ml. in the proteolytic activity determination.
****Grams of lead shot required to press a 1-in. plunger 4mm. into 1-in. thick bread crumb. Average of 12 readings.
s means significant at the 1 percent level.

TABLE XII—COMPARISON of Supplementation Requirement of Different Flours

Relative Enzyme Concentration: High Proteinase — Low Alpha-Amylase Supplement	Low Proteinase — High Alpha-Amylase Supplement	Malted Wheat Flour	Loaf Volume (cc.)	Grain (Percent)	Texture (Percent)	Dough-Handling Properties
Hard Red Winter Wheat Flour, 11.8 Percent Protein						
0	0	0	2510	90	80	Normal
0	0	3X	2610	95	90	Slightly sticky
3X	0	0	2630	85	85	Sticky
X**	0	0	2670	90	90	Normal
X	X	0	2770	95	95	Normal
X	2X*	0	2810	95	95	Normal
Hard Red Winter Wheat Flour, 11.4 Percent Protein						
0	0	0	2870	80	80	Tight, non-pliable
0	0	X	2930	85	90	Normal
X	0	0	2910	90	90	Normal
0	2X*	0	2930	90	90	Normal
X	X	0	2920	90	90	Normal
2X	0	0	2840	87	87	Normal
Hard Red Spring Wheat Flour, 11.9 Percent Protein						
0	0	0	2680	78	80	Tight, non-pliable
0	0	3X	2830	93	95	Slightly sticky
½X*	X	0	3020	95	98	Normal
X	2X	0	2800	80	85	Normal
Hard Red Spring Wheat Flour, 12.1 Percent Protein						
0	0	0	2710	75	70	Tight, non-pliable
0	0	3X	3000	75	85	Normal
3X*	0	0	2980	90	95	Normal
X	2X	0	2830	80	85	Normal

*Optimum supplementation.
**X-concentration of alpha-amylase equivalent to 0.25 percent malted wheat flour per 100g. flour.

TABLE XIII—SUMMARY of Optimum Enzyme Requirements For Five Hard Red Winter and Five Hard Red Spring Wheat Flours

Protein* (Percent)	Ash* (Percent)	Absorption (Percent)	Enzyme Concentration**: High Proteinase — Low Alpha-Amylase Supplements	Low Proteinase — High Alpha-Amylase Supplement
Hard Red Winter Wheat Flours				
11.7	0.46	69.6	X	2X
11.9	0.41	64.0	½X	X
11.4	0.42	61.0	X	X
11.8	0.52	70.2	X	X
11.4	0.46	62.0	X	X
Hard Red Spring Wheat Flours				
11.9	0.39	67.2	X	2X
11.9	0.40	66.1	2X	0
11.9	0.40	66.6	½X	X
12.1	0.40	66.8	3X	0
13.7	0.39	71.0	X	2X

*14 percent moisture basis.
**X-concentration of alpha-amalyase equivalent to 250 mg. of malted wheat flour.

trations were found to be deleterious.

It was evident from this series that a proper combination of alpha-amylase and proteinase produced bread that was superior to that made when one or both components were eliminated from the formula.

The effect of fungal alpha-amylase and proteinase supplementation on bread crumb firmness was further studied. Bread baked with various combinations of alpha-amylase and proteinase was stored for 24 and 96 hr., and firmness of the crumb was determined by a Bloom gelometer.

Both alpha-amylase and proteinase increased the softness of the bread crumb (Table XI). The analysis of variance of these data confirmed the fact that both alpha-amylase and proteinase decreased, while storage increased, the firmness. Calculation of least significant mean differences indicated that 4Y concentration of proteinase caused a significant crumb-softening effect. Alpha-amylase at 1X concentration produced a significantly softer bread crumb. Bread made with 8X alpha-amylase concentration was not softer than that made with 1X.

It had been observed that different flours did not respond equally to the addition of enzyme supplements. Response to alpha-amylase would vary, depending on the extent of starch-granule rupture. It had also been noted that response to proteinase varied according to the characteristics of the gluten proteins.

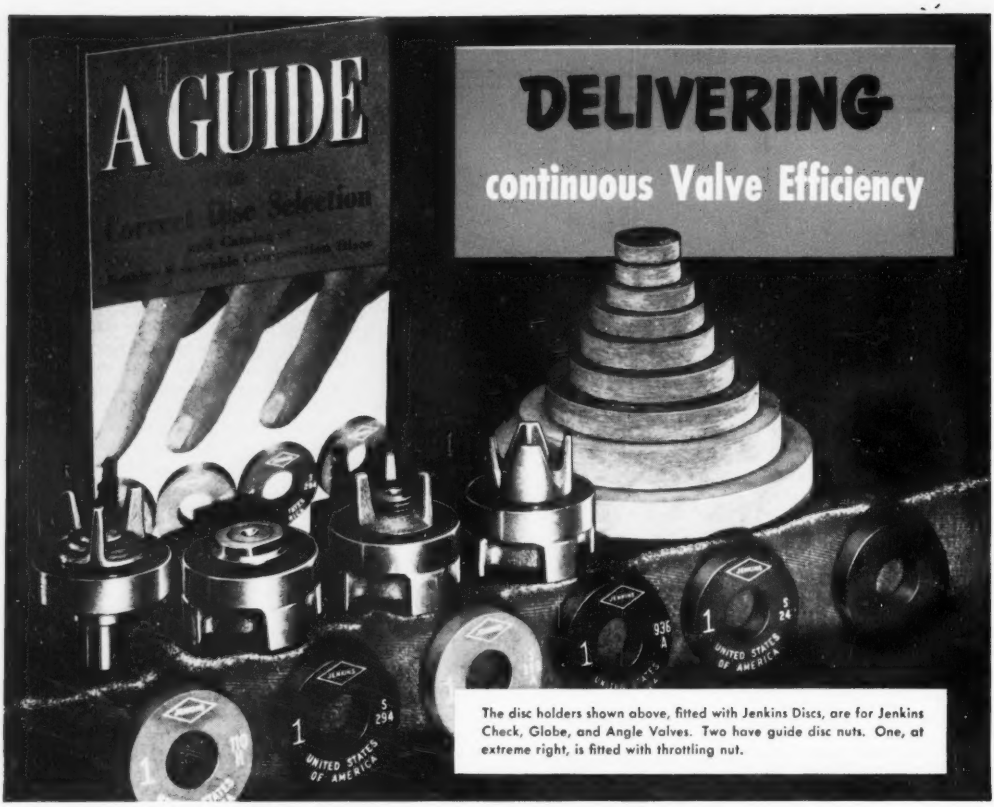
In order to determine what variation in supplementation might be expected, many commercial flours representing hard red winter and spring bread wheats were collected. Two fungal enzyme supplements were obtained—one having a high ratio of proteinase to alpha-amylase and the other a low ratio. Included for purposes of comparison was commercial malted wheat flour. A summary of these experiments for typical flours is presented in Tables XII and XIII.

From these results, it is evident that various flours may require different supplementation. In general, the hard red winter wheat flours produced a superior bread when the ratio of proteinase to alpha-amylase was low. The quality of bread produced with fungal supplements was equal or sometimes superior to that of bread made with malted wheat flour. Spring wheat flours tended to require more proteinase and generally produced a superior bread when the ratio of alpha-amylase to proteinase was higher than that found in malted wheat flour.

References

9. Read, J. W., and Haas, L. W., "Further Studies on the Baking Quality of Flour as Affected by Certain Enzyme Actions." *Cereal Chem.*, 13, 14-27, 1936.
10. Johnson, John A., and Miller, Byron, S. "High Levels of Alpha-Amylase in Baking, I. Evalution of the Effects of Alpha-Amylase From Various Sources." *Cereal Chem.*, 25, 168-178, 1948.
11. Miller, B. S., and Johnson, J. A., "Differential Stability of Alpha-Amylase and Proteinase." *Cereal Chem.*, 26, 359-371, 1949.

This two-part article was based on Contribution No. 191, Department of Milling Industry, Kansas Agricultural Experiment Station. (See Part I).



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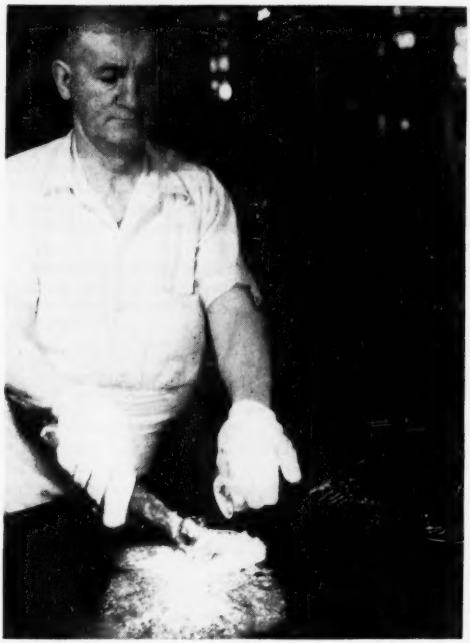


INTO this batch of hard candy goes vitamin-sugar mix. Then comes folding and finishing in the usual manner.

ENRICHED PREMIX is added to this kettle of starch-jelly confection, after the heat is turned off.

How to Vitaminize Candies

Concluding Part II

Carefully discussed are ways to enrich pectin and starch-jelly candies, marshmallows and nougats, and hard confections. Detailed are sources of fortifying agents, and best practices for testing, checking, and labeling these products

ALFRED E. LEIGHTON
Consulting Food Chemist and Candy Technologist, Riverdale, N. Y.
Photos courtesy Hoffman-La Roche, Inc.

There are many possibilities for developing new and attractive kinds of confections—as recently called for by QMC speakers. And the commercial opportunities thus opened are likewise broad.

■ **Here, enrichment of candies with one or more of the important vitamins can afford major values.**

Descriptions of the properties of these vitamins—such as A, B_1, B_2, C, D, and niacin—together with methods of using them in enriching chocolate bars, fudge, and caramels, were presented in Part I of this article (p. 104, Mar. FI). Here, in concluding Part II, are suggested procedures for fortifying pectin and starch-jelly candies, marshmallows and nougats, and hard confections.

Also detailed are sources of enrichment materials, methods for test-checking vitamin content of enriched candies, and labeling practices.

Enriching Pectin-Jelly Candies

As stated, the presence of ascorbic acid (vitamin C) in pectin-jelly candies may alter the pH, which runs within narrow limits. Vitamin C and niacin can be omitted from pectin jellies. However, niacin amide can be substituted for niacin if the inclusion of that vitamin is called for. The other vitamins can be easily incorporated.

A concentrated pre-mix can be made of the water-soluble vitamins. And with the aid of "Tween 80" (a polyoxyethylene sorbitan monooleate), a dispersion of the oil-soluble vitamins can be included and the whole appear clear to the naked eye.

Tween 80 is used in the flavor industry to disperse essential oils mixed with aqueous solutions. It is also used

The Harrisburg Gas Co.

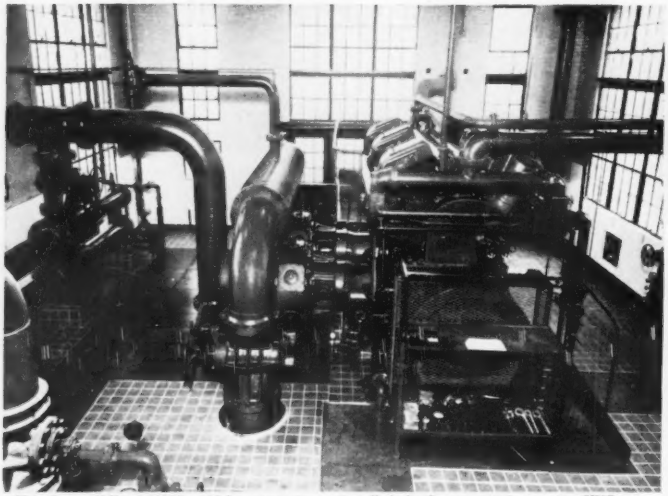
HAS GONE A LONG WAY IN THE PAST 100 YEARS

Erected in 1850 at Harrisburg, Pa., the original plant of The Harrisburg Gas Co. had a maximum output of 25,000 cubic feet per day. Now the company's combined facilities, including a unit under construction, are rated at more than *35,000,000 cubic feet per day!* What's more, growth has continually kept pace with the latest technological advances in the industry. At Steelton, for example, a new catalytic cracking plant has recently been completed—one of the first of its type in the United States.

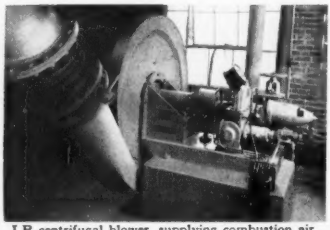
During the past century of progress, The Harrisburg Gas Co. has always placed the emphasis on *continuity of service,* which can be secured only by *quality of construction.* That's one of the reasons why it has repeatedly specified Ingersoll-Rand Compressors and Blowers for all major installations.

The *proved dependability,* operating economy and low-cost maintenance of I-R equipment have become almost a tradition in the gas industry. It took years of experience to build up this reputation—experience in the design, manufacture and application of air and gas handling equipment to meet the rapidly changing needs of the industry. All of this experience is at your disposal—no farther away than your nearest I-R representative.

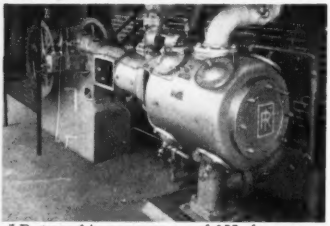
. . . with the help of dependable I-R equipment like this



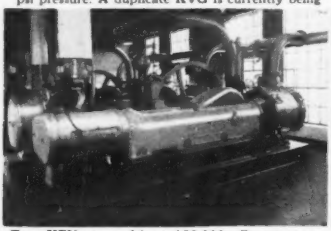
This Ingersoll-Rand KVG, 600-hp gas-engine-driven compressor at the Steelton station can pump 335,000 cubic feet of gas hourly, at 34 psi pressure. A duplicate KVG is currently being installed. At the same station are two XVG gas-engine-driven compressors, each having a capacity of 120,000 cfh.



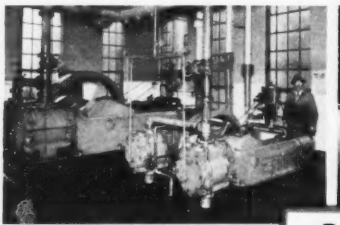
I-R centrifugal blower, supplying combustion air for oil and gas burners in catalytic cracking furnace. Another I-R blower is used for pressure boosting.



I-R steam-driven compressor, of 277 cfm capacity, supplying process air to the cracking furnace at 20 psi.



Two XPV steam-driven 150,000 cfh compressors handling high-pressure distribution for the Harrisburg station.



Two more I-R steam-driven compressors on high-pressure distribution at Harrisburg. The unit at the right has been in service since 1914.

I-R Type 30 compressor supplying 60-psi air for operating the cracking-plant control instruments.

Ingersoll-Rand

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COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • DIESEL AND GAS ENGINES

by the pharmaceutical industry for making poly-vitamin preparations. Suggested use of this material should not be construed as an endorsement. Its employment in the manner mentioned should be cleared with the F&DA. However, the amounts used per unit weight of candy would be small.

Alternatively, a dry pre-mix can also be prepared using either sucrose or dextrose as a base—allowance, of course, being made for either item in the formula if the amount used in the pre-mix addition is a hindrance.

Another suitable base for a dry form of pre-mix is a low fat content cocoa. Pour the oil-soluble vitamin concentrate in a gradual stream onto cocoa while it is being blended in a powder mixer. Water-soluble vitamins can be added to pulverized dextrose or confectioners' sugar and then mixed. Finally, the oil-soluble and water-soluble vitamin pre-mixes are blended and put through a comminuting machine with a suitable size screen. This procedure ensures thorough mixing.

It then becomes an easy matter to weigh sufficient pre-mix for the batch in preparation. The pre-mix is introduced about the time the flavor is added. Sufficient time must be allowed for blending the base sugar or dextrose, as the case may be. This step should always come before the final additions of citric acid solution.

It is always a good plan, when vitaminizing a bulk of material, to make an intermediate mix using some portion of the batch—say 5 to 10 percent (which may have been completely or partially processed)—as a base and adding premix to a known weight of that portion. The intermediate mix is then returned to the material from which it had been withdrawn.

3-Step Enrichment

In other words, the enrichment can be done in three stages to ensure thorough dispersion, as follows: (1) Prepare the pre-mix concentrate; (2) make the intermediate mix by adding a known amount of pre-mix to a known weight of the batch in process and completely mixing them; and then (3) add the intermediate mix to the balance (from which the intermediate base was taken) and complete the processing and mixing procedures, thereby ensuring complete dispersion of the vitamins throughout the bulk of the batch.

The call for extreme care and thoroughness in the mixing technic cannot be over-emphasized in the manufacture of vitamin-enriched candy. Each unit weight of finished material must conform to label claims, and these are very exacting for special dietary foods (in which class enriched-candy falls).

Handling Starch Jellies

The enrichment of starch jellies requires general precautions almost identical to those necessary in making pectin jellies. In the case of the starch jellies, however, ascorbic acid and nicotinic acid can be included if desired. Any one, or more, of the common vitamins can also be incorporated in starch jellies.

There will be some losses due to cooking temperatures, but these can be allowed for by adding a larger amount of the heat-and-oxygen-labile vitamins which, in this case, will be B_1, A, and C, if they are in the mix. Losses of 10 percent, more or less, can be anticipated, and safety margins can be provided by increasing those percentages. If the goods are assayed and vitamin losses do not equal the figures given for the particular process current in an individual plant, then the safety allowance can be cut down accordingly.

The time to add the premix or intermediate mix is after boiling has been completed. Then the vitamins, flavors, and citric acid can be added at one time in a vehicle of invert sugar or a pulverized dextrose base. If synthetic vitamins A and D are included, they can be mixed with several parts of Tween 80 and dispersed in the invert sugar before being added to the batch in the kettle for final mixing. Due regard must be paid to finished weights, which include the sugar added in sanding the candy, when the amount of vitamin enrichment is decided upon for the particular type of confection.

TABLE — SUGGESTED TEXT for Label Carrying Enrichment Data

Type of Vitamin	Vitamin Value (per Oz. of Candy)	Percent of Adult Minimum Daily Requirement
A	4,000 I.U.	100
D	400 I.U.	100
B_1	1 mg.	100
B_2	2 mg.	100
C	30 mg.	100
Niacin	10 mg.	(Not established)

Marshmallows and Nougats

Aerated candies like marshmallows and nougats are best enriched with those vitamins that are stable to oxygen. Vitamins A and C are unstable to oxygen. If they are included during the manufacture of marshmallow, losses of these vitamins during aeration are inclined to be excessive.

Vitamin B_1, while stable to dry heat, may be destroyed to some extent in presence of moist heat. Here, vitamins D, B_2, and nicotinic acid are stable, and they can be added to either one of these aerated confections at the proper stages during processing.

In the case of marshmallows, this would involve using a premix (consisting of dextrose, vitamins, and flavors) incorporated at the flavoring stage. The dextrose used as a base for the vitamins can be allowed for, if necessary, in the formula, by reserving part of it which is normally used in the early processing for the purpose of making the pre-mix and then adding it at the flavoring stage as described.

Nougat enrichment can be carried out with the same precautions as in the manufacture of marshmallows. The stage at which the premix should be added is just prior to the full beat-

Quick Glance at Key Points

1. Contrary to the opinions held by a minority of medical and dental critics, candy in general is a good food. That it is illogical to ascribe any prevalence of dental caries to the regular consumption of candy has been indicated (Part I, Mar. FI.)

2. Candy provides not insignificant proportions of nutrients—carbohydrates, fats, proteins of animal and vegetable origins, vitamins, and minerals—held to be essential in the diet (Part I).

3. In wartime and following its wake, candy can be enriched with vitamins to satisfy the needs of service men in distress or mal-nourished populations (Part I).

4. Particular consideration is given those vitamins that are significant for food fortification, their stability characteristics, and methods of incorporating them into various types of candy (Part I and accompanying Part II).

5. Official methods of testing vitamins and their stability have been indicated (Part II).

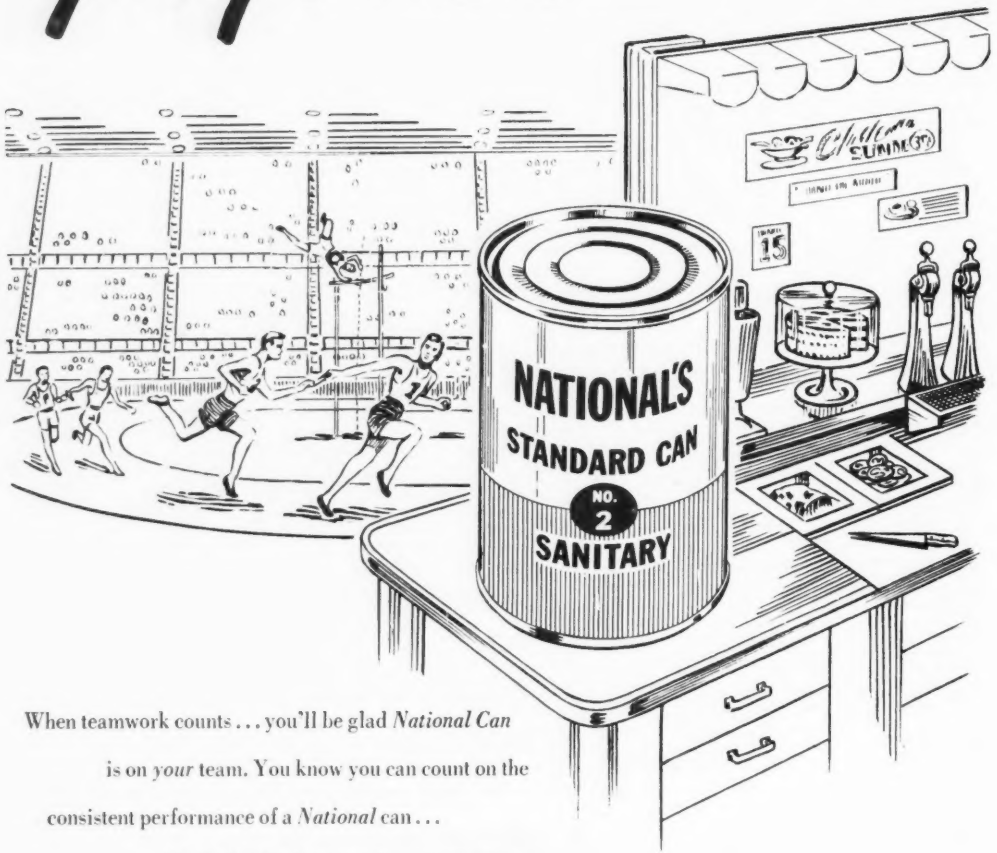
6. Commercial sources of vitamins and concentrates have been listed (Part II).

7. Labeling requirements for vitaminized candy have been outlined (Part II).

8. Employing this information, manufacturers desirous of making vitamin-enriched candies may proceed with their experiments with a minimal loss of time and expenditure of effort in determining necessary procedures (Parts I and II).

NATIONAL CANS

Going Places---



When teamwork counts . . . you'll be glad *National Can* is on *your* team. You know you can count on the consistent performance of a *National* can . . . it's the leader for superior construction . . . it's setting records for superior construction . . . it's a wonderful team mate on your production line.

You'll be on the right track if you let *National Can* help your product "go places!"

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ing operation. Allow some period just short of the full aeration for the proper incorporation of the vitamins so that when the nougat has been fully beaten the vitamins are completely distributed throughout the mass.

Wherever chocolate liquor is used for flavoring, it makes a good vehicle for the vitamin premix if made as described. Dry mixes can be made with pulverized dextrose whenever that item is part of the formula; failing that, invert sugar in controlled amounts can be used.

Fruit-Flavored Hard Candies

These confections do not represent a problem—for here fortification is comparatively simple. A premix is prepared with the necessary vitamins based on or mixed with citric acid. While a known weight of the candy is on the cooling slab, the premix is added. The flavor, such as citrus oil, is poured over the premix and the whole treated as in the regular way of mixing added citric acid and flavor. Particular care must be taken to ensure proper folding in order that the enrichment will be uniform throughout the batch.

Some operators may prefer to make the initial vitamin addition to a portion, say 10 lb., of the plastic candy on the slab, then kneading and folding it in, just as in the addition of color. Then, by adding this initial mix to the rest of the batch from which it has been taken, the whole is now folded and finished in the usual ways.

Testing and Checking

Having made the various enriched candies, the manufacturer must, as a matter of self-protection and as a check on the efficiency of his processing, test them for vitamin content. It is realized, of course, that not every manufacturer has a well-staffed and properly equipped laboratory where vitamins can be assayed. And in such cases the material must be tested by commercial laboratories. In most large cities there are commercial laboratories that specialize in testing vitamins in foodstuffs.

The experimentally fortified candies must be tested for vitamin content per unit weight and for vitamin stability over a period of time. It is to be expected that the vitamin value of candies will become lower with age. How much lower can be determined by the chemist, who employs suitable testing methods.

Losses from to 15 to 20 percent may occur over a period of time, say six months to one year. And such losses determined by accelerated tests will indicate how large a safety margin the manufacturer must allow himself in the amount of vitamins added

Model FF Frozen Food Wrapping Machine

More FFs for Snow Crop

After having used other types of wrapping machines, Snow Crop Marketers tried our Model FF... Saw what it could do to speed up and simplify their wrapping operations. As a result, these prominent packers have standardized on FF machines, and have recently ordered an additional battery.

The reason why the Model FF is winning such widespread approval among leading packers is that it has been *especially designed* for the wrapping of frozen foods.

With an FF you get fast, uninterrupted production and equally fine wraps whether the goods are wrapped before or after freezing. And you can wrap regular cartons and metal-end fibre cans on the same machine.

Automatic adjustment makes allowance for variations of up to 3/8" in the width of packages. Speeds of better than 100 per minute and quick change-over for different package sizes enable you to handle peak loads with ease. A solenoid knockout device prevents jams. Its special infeed prevents spilled produce from being carried into the machine. Cleaning and oiling take far less time than on other machines. And special guards provide utmost safety for the operator.

Get all the facts on the Model FF from our nearest office.

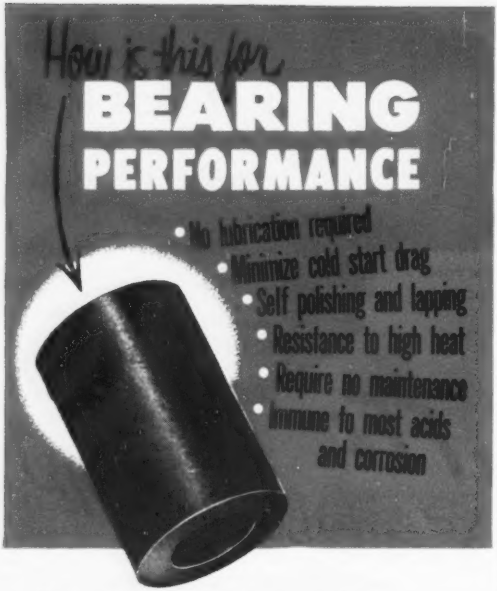
•

See us at the PACKAGING SHOW
Atlantic City Auditorium
Booth 315, April 17-20

•

PACKAGE MACHINERY COMPANY
SPRINGFIELD, MASSACHUSETTS

NEW YORK CHICAGO BOSTON CLEVELAND ATLANTA DALLAS
DENVER LOS ANGELES SAN FRANCISCO SEATTLE TORONTO MEXICO, D.F.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• No lubrication required
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Cut maintenance costs...
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SELF-LUBRICATING
CARBON BEARINGS

These durable bearings require no lubrication — a vital consideration in inaccessible locations in machinery and sealed mechanisms. MORGANITE carbon graphite Bearings are unaffected by high temperatures because their self-lubricating action is derived from the inherent nature of the material itself, and is not an impregnation. Expensive finishes are unnecessary since Morganite is self polishing and lapping with use. The fact that it is immune to most corrosive acids and chemicals generally, is an advantage appreciated by many design engineers and maintenance superintendents.

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Manufacturers of CARBON SPECIALTIES, MOTOR and GENERATOR BRUSHES and CARBON PILES

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SPISORESINS

The newest advance in the art of flavoring and the science of seasoning.

Spisoresins are special extractions of dry spices possessing all the flavor qualities and values of dry spices. Spisoresins produce a more uniform and finer flavor than dry spices and are also more economical to use and handle. Spisoresins meet the requirements of the Bureau of Animal Industry.

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DODGE & OLCOTT, INC.
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LOS ANGELES • PHILADELPHIA • ST. LOUIS • SAN FRANCISCO

ESSENTIAL OILS • AROMATIC CHEMICALS
PERFUME BASES • VANILLA • FLAVOR BASES

to a given batch. At the same time, he will also learn about the efficiency of his mixing, because he knows how much vitamin he has added to a given weight of candy. Based on such findings, the manufacturer can determine where to make corrections, if any.

In the larger organizations having properly staffed and equipped laboratories, testing for vitamins is by the accepted U.S.P. or AOAC methods. The official assay for vitamin D at present is by bio-assay, and this vitamin should be given out to some commercial laboratory for testing, since the procedure involves the use of rats.

Indeed, it is doubtful that any of our candy manufacturers have a nutritional laboratory where animals are available. The advisability of having animals for this purpose in a candy-factory laboratory is open to question, unless such a laboratory is some distance from the plant and housed in a separate building. In any case, workers with animals have to be cognizant of all the pitfalls and precautions that have to be taken to ensure reliability and reproducibility of results.

The accelerated test for stability consists of placing the test candy in an oven constantly maintained at 113 deg. F. and of testing the material at 500-hr. intervals to determine vitamin content and changes. On the basis of stability tests, processing procedures will be confirmed or negatived, in accordance with results and procedures adopted for correction where indicated.

Sources of Pure Vitamins

Several of the pharmaceutical manufacturers produce vitamins in bulk for the industries engaged in food fortification. The water-soluble vitamins are available in grams to kilos from firms like Hoffman-La-Roche, Inc.; Merck & Co., Inc.; Pfizer & Co.; and Sterwin Chemicals, Inc. Oil-soluble vitamins, natural and synthetic, can be obtained from Distillation Products, Inc., and Nopco Chemical Co. Sterwin Chemicals, Inc., produces various forms of standardized vitamin D (natural) and sells them in convenient packages.

Labeling

Proper labeling of products that are vitamin enriched is a matter of extreme importance, in order to comply with F&DA regulations. Broadly, an enriched product is held to be a special dietary food, and it must comply with the following requirements:

The label must bear an open statement as to the identity of the vitamins claimed to be present per unit weight of the food. In addition, the percentage or relationship which such

Here's what
IN-PLANT CHLORINATION can do

"Member of National Canners Association"

BAKER CANNING COMPANY

Theresa, Wisconsin

April 4, 1949

PACKERS OF NUMBER 10 TINS
Wisconsin Quality
. . Peas . .
Whole Kernel Corn
Address all Communications to Theresa, Wisconsin

Wallace & Tiernan Co., Inc.
Newark 1, New Jersey

Gentlemen:

We have been using In-Plant Chlorination for a few years, and feel that this piece of equipment is just as important in a canning factory as any other piece of equipment used in the processing of canned foods.

The first year we installed In-Plant Chlorination we had chemists make bacteria counts, and checks at approximately fourteen points throughout the plant, such as picking table belts, flume systems, washers, blanchers, fillers, closing machines etc. In making these tests we did not use In-Plant Chlorination for one week, and the next week we used In-Plant Chlorination in order to make comparisons as to bacteria count.

The reduction in bacteria count, between the two operations is almost unbelieveable. We found that by using this equipment properly, and increasing the dosage at clean-up time, we eliminated bacteria at many of the check points. One cannot, however, install In-Plant Chlorination and forget about a good housekeeping job. This would be an error, indeed.

However, by having In-Plant Chlorination, and doing a good job of house-cleaning, one can eliminate the building up of bacteria in most any piece of equipment. We do find that by using In-Plant Chlorination the clean-up time necessary at clean-up periods is practically cut in half.

You may use this letter in part or in full - for any purpose you care to.

Yours very truly,

BAKER CANNING COMPANY

By Robert Baker

RDB:eml

In-Plant Chlorination, engineered by Wallace & Tiernan, can help your plant, too. Bacterial counts are reduced, odors controlled, and on-the-line time for processing equipment increased when you use this proven method.

Call your nearest W & T Representative now for complete information.

Other services by Wallace & Tiernan Associated Companies include Merchen Feeders for precision blending BY WEIGHT; Richmond Sifters for all separating problems involving powdered or ground materials; and Richmond Permaflux Magnets for the complete elimination of any ferro-metallic contamination of your food line.

WALLACE & TIERNAN
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CHLORINE AND CHEMICAL CONTROL EQUIPMENT
NEWARK 1, NEW JERSEY • REPRESENTED IN PRINCIPAL CITIES

NEW! REVOLUTIONARY!

STEINLITE ELECTRONIC MOISTURE TESTER

measures moisture content from 0 to 100%, accurately quickly, economically!

- *Insures Quality*
- *Eliminates Costly Guesswork*
- *Provides Laboratory Equipment at Reasonable Price*

Now, an amazing new instrument that helps you master difficult moisture testing problems in a few minutes. Here's a scientific electrical tester that saves time and money and brings bigger returns from products you buy and sell.

For example, this new Steinlite Model 300, developed after years of research and extensively field-tested by leading food processors for three seasons, proves invaluable in every sweet corn packing step—because *moisture content definitely determines quality.* And higher quality generally means greater profits. The Steinlite has been successfully used to establish exact harvesting dates . . . to improve grading . . . to aid processing.

"No Special Training Required to Operate It"

Reports Oconomowoc (Wisconsin) Canning Company: *"We used the Steinlite Moisture Tester exclusively for the past three years in pre-grading, thus eliminating all guesswork in arriving at the proper time of harvest. It operates economically and accurately and we found no special training was required."*

Further, you can make a test with this Steinlite in 6 minutes . . . or less. No previous experience necessary . . . no laboratory technique required. It's low in cost . . . readily portable. You need not be near a water supply. Only a cloth is needed to wipe the equipment dry after using.

Undoubtedly moisture content is an important factor in the price, quality, processing or storage of your products. Steinlite models for testing all manner of free-flowing materials are available — in any moisture range. Already, charts for more than 200 products have been prepared. From Seedburo you can obtain the most highly developed moisture testing service in America. Describe your moisture testing problem and we will be glad to offer a solution.

SEEDBURO CHICAGO

Seedburo Equipment Company,
734 Converse Building,
Chicago 6, Illinois.

addition bears to the minimum daily requirement of the adult must be stated.

Thus, if the candy contains, shall we say, 4,000 I.U. of vitamin A, 400 I.U. of vitamin D, 1 mg. of thiamin, 2 mg. of riboflavin, 30 mg. of ascorbic acid, and 10 mg. of niacin or niacin amide per ounce weight, then such confection will be correctly labeled if it bears the weight of each vitamin present per ounce (the unit weight must be mentioned because it is that weight that established the level of enrichment).

Alongside each weight, a statement should appear that this level is 100 percent of the minimum daily requirement of that vitamin for adults. However, in the case of niacin or niacin amide, minimum adult daily requirements are not established. And this fact must be mentioned in the text alongside the stated level per unit weight of candy. Example: "Niacin—minimum daily adult requirements unestablished—10 mg. per oz."

—End—

Mechanizing Clinches Quality

—Continued from page 122

kidneys are removed, then go through another spray washer. Leaving this washer, the eviscerated chickens are removed from the shackles and stored in ice in chill vats.

Packing and Freezing

From this point the operation varies with the type of bird being processed. In the case of fresh frozen chicken, the birds are removed from chill vats and hung onto shackles of an overhead conveyor in the cutting and packaging department. As they move through this department, fryers are cut up "Southern" style by hand and the individual pieces are dropped onto a stainless steel conveyor belt. Operators, sitting on each side of this belt, place the pieces in cartons for freezing.

Packages are then weighed, closed and carefully wrapped in an attractively illustrated waxed paper, sealed by heat and placed on bakery-trucks for transfer into the quick freezer, which is maintained at —40 deg. F. After approximately 3-4 hr., a truck is moved from the freezer into the wrapping and casing room (see accompanying drawing). Here, containers are packed in master cartons and loaded onto pallets. A fork-lift truck then moves filled pallets into 0 F. storage.

Delivery to distributors and stores is by Jewell's own fleet of refrigerated trucks.

Frozen fresh chicken is packed in

three forms: Consumer, institutional, and as whole fryers. Consumer packs comprise whole cut-up fryers, packed 6 chickens to the master carton; 1-lb. cartons of breasts, thighs, drumsticks, wings, or gizzards; and ½ and 1-lb. packages of livers, each packed 12 to the master carton. Institutional packs contain 5-lb. of parts.

Byproducts Utilized, Too

Heads, feet, feathers, offal, and other waste products, are trucked from the processing plant to a byproducts plant also operated by the Jewell Co. Here, the heads, feet and offal are heated and pressed to separate the grease from meat scraps. Latter are sold to feed mills to be used as a protein supplement in poultry feed. The grease is sold to manufacturers of soap and glycerin. Feathers go into fertilizer.

In addition to the wastes from its own processing, this plant is now handling similar byproducts from several other poultry processing plants in Gainesville. This operation was started as the least expensive method of disposing of a "nuisance"; today, it pays the plant a profit.

End (Resume reading on page 123)

Switch To Continuous

—Continued from page 98

the heater act as a centrifugal pump to deliver the cream directly to a separator, from which it emerges with a fat content of 88 to 90 percent.

The separator is a special De Laval industrial-type machine designed to handle sweet or sour cream without clogging. It differs from a standard-type cream separator in that orifices in the periphery of the bowl permit the curd or heavy skim to discharge continuously. The separator has three discharge outlets—one for the high fat concentrate, one for the skim milk, and one for the heavy skim, which consists largely of curd.

Both the skim milk and heavy skim discharge into a 20-gal. surge tank to be further processed into animal and poultry feeds. The fat concentrate flows to a second surge tank, from which it is pumped to a Vacreator* vacuum pasteurizer. In this unit, the concentrate is heated to about 200 F. for continuous pasteurization and then cooled by evaporation to 110 F. This latter operation removes feed, weed, and other volatile off-odors and flavors. Fat concentrate flow is at the rate of about 3,500 lb. per hr.

* Trademark Reg. U. S. Patent Office and Canada for vacuum pasteurizers.

Increase sales appeal
Raise flavor levels . . . with

Huron **MSG**
MONOSODIUM GLUTAMATE 99+%
and
Huron **HVP**
HYDROLYZED VEGETABLE PROTEINS

Increased taste appeal means increased sales appeal. Food processors throughout the country are giving their products taste appeal and more sales appeal through use of Huron MSG and Huron HVP.

The addition of small amounts of Huron MSG and Huron HVP will bring surprising results. No other formula changes are necessary.

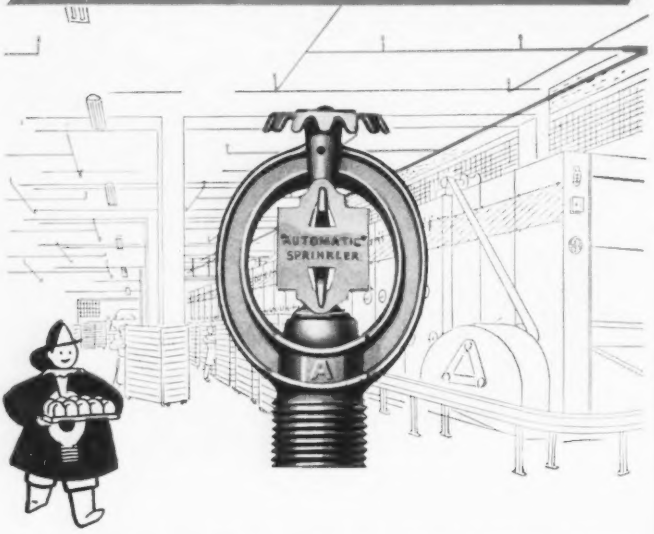
SOUPS:

In chicken soups add MSG at 0.2% on a ready-to-serve basis. For vegetable soups and chowders, use MSG at 0.15%, while for mushroom and creamed vegetable soups use MSG at 0.2%. Soups with strong beef stock taste are more effectively improved with Huron HVP, prepared in liquid, paste and powder form for convenient application. In canned soups of this type the HVP liquid should be added at 1.0% up to 2.0%. Soups of less pronounced meat stock flavor should contain 0.5% to 1.0% HVP alone, or in combination with the amounts of MSG recommended above. For dry soups the HVP powders are used, at corresponding levels, adjusted for flavor solids content.

Call on us in confidence for assistance. Samples will be sent immediately with specific recommendations.

Huron
MILLING COMPANY
9 Park Place, New York 7, N. Y.
161 E. GRAND AVE., CHICAGO 11, ILL.
383 BRANNAN ST., SAN FRANCISCO 7, CAL.

FIRE SAFETY WITH SAVINGS FOR AMERICAN BUSINESS



These bakery plants get safety-plus, with Fire Protection by "Automatic" Sprinkler

Here listed are but a few of the nation's leading bakery products manufacturers who are safeguarding lives, property and—saving money, through the investment of absolute "Automatic" Sprinkler fire protection:

American Stores Company	.	Philadelphia, Pa.
Burny Brothers, Inc.	.	Chicago, Ill.
Capital Bakeries, Inc.	.	Pottsville, Pa.
George E. Drake Baking Co.	.	Pittsburgh, Pa.
Finney's Holsum Bakery	.	Greenville, Texas
Gordon Baking Company	.	Detroit, Mich.
Hathaway Bakeries	.	Syracuse, N. Y.
Hathaway Bakeries	.	Boston, Mass.
Holsum Bakeries, Inc.	.	Tampa, Fla,
Johnson Biscuit Company	.	Sioux City, Iowa
Kern's Bakery	.	Knoxville, Tenn.
McGough Bakeries Corp.	.	Birmingham, Ala.
Pacific Cracker Company	.	Los Angeles, Calif.
Purity Bakeries, Inc.	.	Kansas City, Mo.
Purity Baking Company	.	Rockford, Ill.
Schwebel Baking Company	.	Youngstown, Ohio
United Cooperative Society	.	Fitchburg, Mass.

Adequate fire protection is essential to the economic operation of any food products plant and—the same is true for all types of industrial, commercial and institutional properties.

Our field representative will be happy to prepare a fire protection analysis for your consideration. Then, you'll be able to see at first hand, why "Automatic" Sprinklers are universally recognized as an important investment today . . . welcomed protection tomorrow—next week—next year—or whenever they are needed.

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA
YOUNGSTOWN 1, OHIO

"Automatic" Sprinkler
FIRST IN FIRE PROTECTION
DEVELOPMENT . ENGINEERING MANUFACTURE . INSTALLATION
OFFICES IN PRINCIPAL CITIES OF NORTH AND SOUTH AMERICA

For conversion into butter, the pasteurized fat concentrate, containing 10 to 12 percent water, is delivered to 600-gal. standardizing vats equipped with special agitators. Here its temperature is raised to about 105 F. and its moisture and pH are adjusted to 17 percent and 7.0, respectively. Whole milk starter or culture for flavor development and 2½ percent salt are then added. These adjustments and additions are made by quality control laboratory technicians, or under their supervision. Tests are those commonly used in creameries and butter-making plants. Butter color, if desired, and the whole milk starter or culture, are added on a measured basis.

While the standardized fat concentrate in one or two vats is being converted into butter, other vats are filled and their contents methodically standardized and check-tested to maintain the continuity of operation. After standarization, the fat concentrate is delivered, by a sanitary constant-flow pump, to two continuous chilling units, each of which has a rated capacity of 2,000 lb. butter per hour.

These chilling units are similar in construction and operation to continuous ice cream or lard freezers. Each consists of two ammonia-cooled cylinders equipped with scraper-type agitators that remove the chilled butter from the cylinder walls and blend it into the liquid mass to obtain a homogeneous, uniformly chilled mixture of firm consistency and partial emulsification.

Attached to each unit is a volume meter which feeds nitrogen into the butter to give it body and texture similar to batch-churned butter that normally contains 4 to 5 percent air. Each unit, in cooling the fat mixture from 105 to 40 F., requires about 12 tons of refrigeration.

Worked Into Butter

From the chillers, the product goes directly to Texturators, where it is subjected to a mechanical treatment similar in function to the working of butter in churns. Passage through these units is at a rate that permits formation of fat crystals characteristic of normal butter

To a large extent, the working action is obtained by forcing the butter through a perforated plate at the discharge end. The shreds resulting from this passage are assembled and compressed into a firm, compact mass by means of a stainless steel nozzle with a 6x6-in. cross section.

The resulting butter has a firm consistency that is both waxy and plastic in character. At the same time, it has a fine, or closely knit, grain that gives it a smooth feel on the palate and good spreading performance on bread. Its

water content is so uniformly distributed among the fat crystals that the butter shows no evidence of "weeping" or leaking.

Finished butter, discharged from the Texturator nozzle, may be bulk packed, fed direct to a printer or molder to be shaped for wrapping and packaging in retail market units, or cut into bars or slabs of convenient length for temporary storage prior to printing, wrapping, and packaging.

When the installation is fully completed in the Pilley plant, it will include automatic printing direct from the butter-making unit. Installation of this printing equipment is to be made as rapidly as it is delivered. Further savings in floor space and man-hours will then result.

At present, the butter is mostly cut into blocks, put on lift-truck platforms, protected with parchment paper, and run into cold storage for about 24 hr. to maintain an adequate supply for the printing and packaging operations.

Anhydrous Milk Fat

If the desired end-product is anhydrous milk fat, the pasteurized concentrate from the Vacreator is again passed through the separator to increase the fat to approximately 99 percent. Then, the majority of the residual moisture is removed by vacuum pasteurization. This product is filled directly into cans, or similar containers, and given an air-tight seal.

Anhydrous milk fat requires 20 percent less storage space than does plastic cream or butter and 50 percent less than frozen cream. It will keep indefinitely at 0 deg. F.

Coincident with the conversion of butter-making operations to a continuous basis, concrete floors in the butter-making area were replaced by non-slip dairy-type tile brick set in a special binder or cement (water-, steam-, and fat-resistant). Walls and ceiling were covered with a hard enamel-like white paint recommended for milk plant use.

Additional savings resulting from this conversion include: (1) Reduced steam and refrigeration requirements; (2) elimination of brine system of cooling, with attendant corrosion; (3) elimination of butter washing; and (4) reduction in cold storage, since less space is needed to store milk fat in the anhydrous form than is required for frozen cream, plastic cream, or even normal butter. Also, avoidance of weeping or leaking cuts down weight loss during handling and storage.

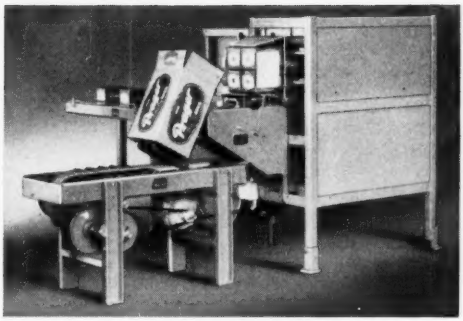
With exception of two FE pictures in middle of page 99, all of the photos in this article were furnished by the Cherry-Burrell Corp.

End (Resume reading on page 100)

NOW!

for increasingly Popular

TAKE-HOME CARTONS



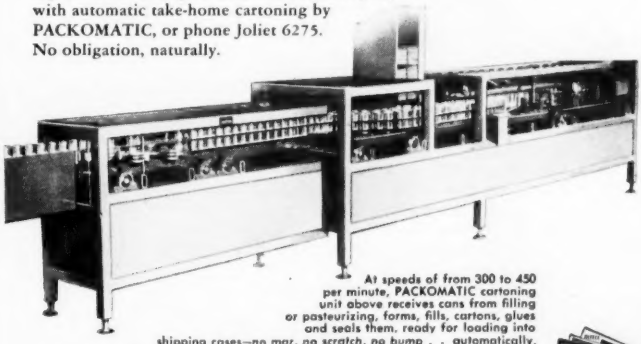
PACKOMATIC's case loader receives completed take-home cartons and automatically packs them into shipping containers placed on loading head by operator. Loaded cases are automatically discharged on take-away conveyor to sealing machine.

Completely automatic carton forming and sealing . . . master case loading, gluing, sealing by PACKOMATIC

Take-home cartons—as popularized by the beverage industry—are becoming increasingly important in the marketing of many food products.

Meats, milk, juices, vegetables, baby foods, pet foods and soups—all lend themselves to multiple packaging in take-home cartons—to the increased satisfaction and profit of both retailer and consumer.

If you are considering the many advantages of multiple-unit packaging, write for the fascinating "ATLAS STORY" developed out of practical experience at Chicago's Atlas Brewing Company with automatic take-home cartoning by PACKOMATIC, or phone Joliet 6275. No obligation, naturally.



At speeds of from 300 to 450 per minute, PACKOMATIC cartoning unit above receives cans from filling or pasteurizing, forms, fills, cartons, glues and seals them, ready for loading into shipping cases—*no mar, no scratch, no bump . . .* automatically.

Automatic gluing and sealing the PACKOMATIC way means faster, better, less expensive packaging, *plus* increased sales and greater profits.

PACKOMATIC

PACKAGING MACHINERY

J. L. FERGUSON CO. JOLIET, ILL.

Chicago • New York • Boston • Philadelphia • Baltimore • Cleveland
Denver • San Francisco • Los Angeles • Seattle • Portland • Tampa • Dallas

J. L. FERGUSON COMPANY
1341 Republic Avenue, Joliet, Illinois

☐ Please send me "The Atlas Story". We are interested in ☐ automatic cartoning machinery ☐ shipping case loading ☐ sealing ☐ imprinting machines for *

Company _____

By _____ Title _____

Address _____

* Indicate product here

NEW PACKAGES & PRODUCTS

Wrap Saves Critical Cellophane

With cellophane in short supply, Milprint, Inc., Milwaukee, is offering its "Revelation," a combination of cellophane and wax paper, or cellophane and opaque bond, which is gaining wide popularity in the wrapping of many diversified food products. In some cases, it is said to save as much as 60 percent of the cellophane normally used.

Many bakeries are now using this wrap. It is particularly suited to products of the Brown 'n Serve type. Fabricated by joining two waxed paper sidewall strips to the center of the cellophane window, it permits partial visibility yet retains excellent keeping qualities.

Shown above are some of the products of companies now using this package—Cole's Baking Co., Bluefield, W. Va.; and Zinsmaster Baking Co., Minneapolis. Ward Baking Co., New York, and Schott's Bakery, Inc., Houston, Tex. are also using similar packages.

Used for prepackaging of fresh vegetables, the wrap gives protection, at the same time allowing for good visibility and brand identity. This is seen in the celery package of Bay State Produce Co., Inc., Boston, Mass.

It is also finding wide use for meat products, the greaseproof sidewalls offering extra printing surfaces for brand identification, etc. Smithfield Packing Co., Smithfield, Va., is now offering its "Luter's" sliced bacon in this wrap.

National Food Products, Inc., New Orleans, La., has found it to be a practical and attractive wrap for its spaghetti and macaroni.

"Superfined" Salad and Cooking Oil

With its Kraft Salad Oil going into national distribution, Kraft Foods Co., Chicago, has made its entry into the salad oil field.

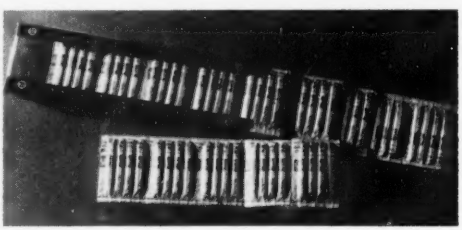
The product, a new "superfined" salad and cooking oil, is a light-bodied, smoothly blending vegetable oil. It was developed after years of research by the same technicians and food oil experts who make Miracle Whip salad dressing. According to the company, this new salad oil not only blends with and emphasizes the distinctive flavors in salad dressing and salads but also protects delicate flavors and gives light and tender quality to fried foods.

It is marketed in pint and quart size bottles of a special light-filtering glass.

Variety of Cocktail Mushrooms

To satisfy different tastes, D. Vincenti & Co., Kennett Square, Pa., offers a variety of glass-packed cocktail mushrooms. They come in Sweet, Sour, in Port or Sauterne Wine, pickled in cider or wine vinegar, and packed in olive oil, peanut oil and spices.

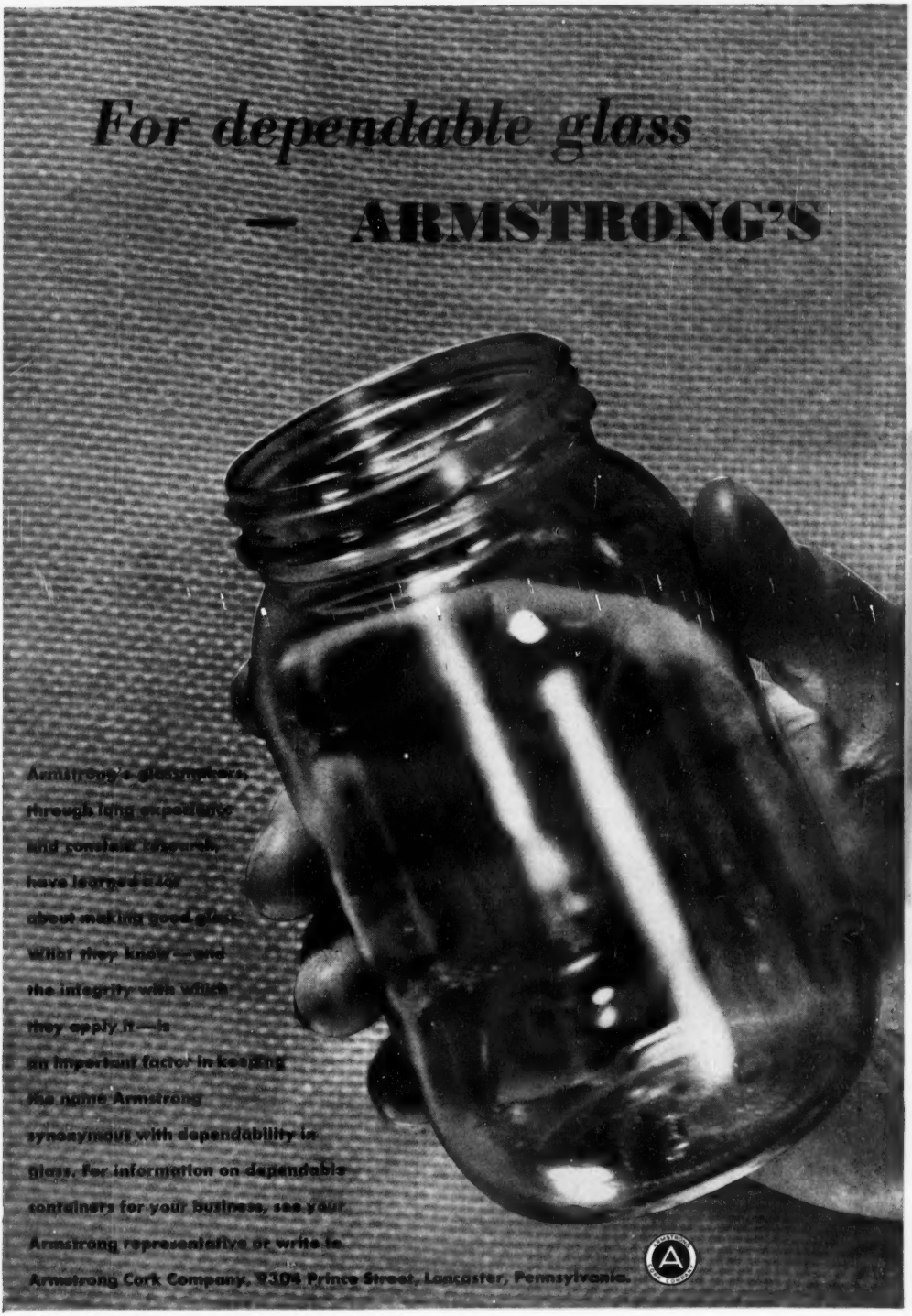
These mushrooms are packed in 3½ oz. crystal pressed tumblers and sealed under vacuum with Anchorvac caps, supplied by Anchor Hocking Glass Corp., Lancaster, Ohio.



Salt Packets for Lunch Box or Picnic

A novel offering in salt packaging is the new lunch-box salt packets developed by Diamond Crystal-Colonial Salt Div., of General Foods Corp., St. Clair, Mich., and Akron, O.

Packaged in a chipboard tray, approx. 6½ in. x 2 in., and overwrapped with cellophane, are five heat-sealed double sheets containing salt. These sheets are divided into five scored sections, each containing four small packets of salt which, when detached and opened, act as a shaker. Each strip has a perforated line at top for opening.


For dependable glass
— ARMSTRONG'S
Armstrong's glassmakers, through long experience and constant research, have learned a lot about making good glass. What they know—and the integrity with which they apply it—is an important factor in keeping the name Armstrong synonymous with dependability in glass. For information on dependable containers for your business, see your Armstrong representative or write to Armstrong Cork Company, 9304 Prince Street, Lancaster, Pennsylvania.

High Quality Wild Game Products

Starting as a hobby, Mr. Jacques Makowsky of Idle Wild Farm, Pomfret Center, Conn., has built up a specialized wild game food business, processing some 160,000 birds last year.

White African guineas, Rock Cornish game hens, and wild turkeys are among the products processed. At Idle Wild the eggs are produced and hatched, then fowl raised, processed, packed and distributed.

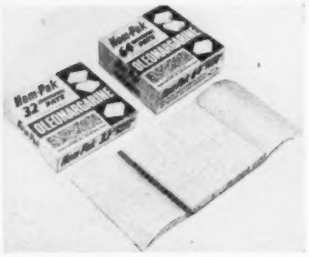
Institutional trade (covering restaurants and hotels in New York, Chicago, New Orleans, Miami, and other cities) is served, as well as individual orders.

For institutional trade, 24 birds are packed in a wooden box. The birds are plucked but are uneviscerated. Wet ice refrigerates them for short shipment by truck or railway express. For distant shipments, dry ice is placed over the wet ice.

For individual orders, two birds are packed, each in Cry-O-Wrap, supplied by Dewey and Almy Chem. Co., Cambridge, Mass., and frozen before being packed in a folding paperboard carton. For shipment, cartons are packed in wooden boxes and refrigerated with dry ice.

Contributing to the original package design were the Everett Wadey Co., Lindsey & Co., Richmond, Va., and Reynolds Metals Co., New York, the latter being the supplier of the aluminum foil.

Queried as to whether it anticipated any difficulty in continuing use of the aluminum foil wrap because of current restrictions, the company states that "only the government and international situation can answer this".



Oleomargarine Pats

Now available in 8 oz. and 1 lb. packages are "pats" of oleomargarine. Introduced by Texas Star Foods, Inc., San Antonio, Tex., the product consists of quarter-pound "flats" instead of the conventional sticks.

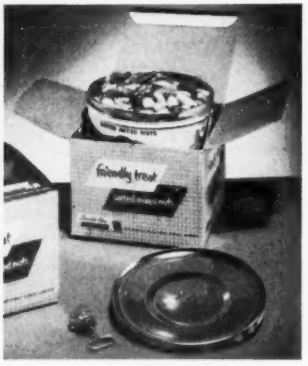
Each flat is pre-cut into 16 individual pats which are readily broken off for serving or for accurate measurement into recipes. The bottom of the carton gives complete measuring instructions.

Aluminum Foil for Cookies

One of the first companies to use aluminum foil as an overwrap, Southern Biscuit Co., Richmond, Va., now has five items being foil wrapped, with a sixth, Vanilla Thins, scheduled to appear on the market shortly.

In addition to national distribution of these products, the company serves approximately 21 foreign markets.

The laminated heat-sealed aluminum foil outer wrap not only protects the flavor and crispness of the product but presents an attractive and eye-appealing package. Each variety is wrapped in a distinctive and gaily multi-colored foil. Packed in a chipboard carton, cookies are further protected by a double liner of waxed fluted parchment. All the varieties except the Colonial Creams are placed in two rows with a divider of the fluted parchment between the rows. The Colonial Creams are placed in six brown fluted wax paper cups.



Nuts In Double-Pack

Formerly using only the can, Kelling Nut Co., Chicago, is now offering its "Friendly Treat" assortment of salted mixed nuts in a can-in-carton pack.

Each can, containing a full pound of vacuum-packed nuts is placed in

a clay coated kraft carton. This is a folding carton, with reverse tuck lock-bottom.

Printed in 3-color letterpress, deep brown, rust and buff-yellow, the use of white undercoating gives the effect of a package design of four colors.

Package was designed by Robert Sidney Dickens Assoc., Chicago. Carton manufacturer: American Coating Mills, Chicago, Div. of Owens-Illinois Glass Co.

"Shake 'n Serve" Salad Dressing

Inaugurating a completely new idea in salad dressing, 4 Seasons, Inc., Los Angeles, has introduced the "4 Seasons" salad dressing kit, which is currently being distributed nationally by The Mitchell-White Corp., New York.

Using a radically new method, the kit aims to eliminate guesswork for the consumer. It contains a graduated 10-oz. mixing bottle and four packets of seasonings with 27 ingredients. Each packet makes a different dressing—Old Fashion French, Exotic Herbs, Paprika French, and Old Fashion Garlic.

To prepare, it's only necessary to pour a packet into the graduated bottle, add the vinegar, water and oil to the points indicated on the bottle, shake, and it's ready. One bottle is considered sufficient for an average week's supply.

The product is packaged in a paperboard carton, colorfully illustrated in yellow, green and red. The seasonings are packaged in heat-sealed laminated glassine foil packets, gaily illustrated against a plaid background, green against yellow, red against blue, blue against red and yellow against green. The bottle, supplied by the Glass Container Corp. of Ill., has a 3-color applied color label that carries out the yellow, red and green of the package.

Closure, by Anchor Hocking Glass Corp., Lancaster, Ohio, is in red with "4 Seasons" imprinted in white.

Pancake Batter

In many cities, the housewife can now have a ready-mixed pancake batter delivered with her morning milk.

Grid-L-Rich, Inc., Chicago, has developed the product, called Grid-l-Redi—a pancake batter which eliminates all measuring and mixing of ingredients. It is packaged in a regular wax paperboard milk container, in either pint or quart sizes, with a pouring spout protected by a perforated sealed flap which enables the user to pour the batter directly on griddle.

A quart container holds enough batter to make from 28 to 32 pancakes. However, it is not necessary to use all the batter at one time. It is said that batter held in the refrigerator can be kept for about two weeks.

Makers of the product supply the dry mix to franchise processors in various parts of the country. At these points the mix is processed into the finished batter, packaged into the wax containers, and sold through dairies and food stores.

IN 1/10,000th SECOND WE LEARNED A LOT!

Recently we photographed the deck of a Specific Gravity Separator while it was actually oscillating at 400 strokes per minute . . . Using electronic light at 1/10,000th second, the results graphically revealed how even the slightest adjustments of deck inclination, speed of vibration, and air volume control, are infinitely reflected upon various types of dry food products being cleaned, classified, and salvaged . . . Facing a future of processing poorer quality raw products? . . . S S & S equipment (Specific Gravity Separators and Air-Float Stoners) may be *your* profitable answer, too.

NOW UNDER EXPERIMENT — *The separation of frost damaged mustard from useable mustard seed. (See below.)*

Have you written for your copy of *"Nothing Ventured?"* . . . a folder which describes briefly an opportunity for the imaginative process engineer to prove conclusively whether or not the S S & S Process can provide immediate solutions to *specific* separating problems. Free copies, from the second printing, are being mailed to supervisory personnel upon request. . . Also available is literature giving engineering data, installation drawings, etc., on all models of Separators and Stoners. (Address Dept. A.)

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1031 SOUTH HASKELL • DALLAS, TEXAS

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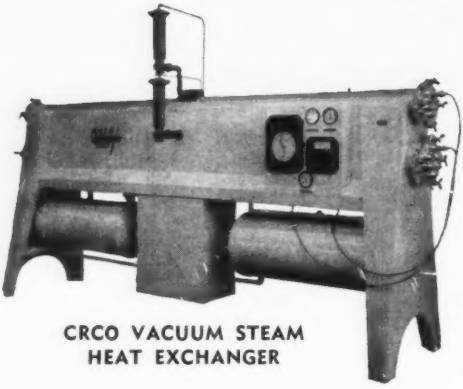
SUTTON, STEELE & STEELE, INC.

CRCO HEAT EXCHANGERS

INSURE GREATER

Quality Production

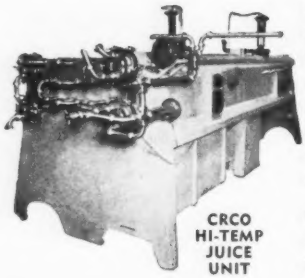
AT A LOWER COST



CRCO VACUUM STEAM
HEAT EXCHANGER

CRCO Vacuum Steam Heat Exchangers are outstanding for pre-heating and pasteurizing juices, semi-liquids and purees. They are equipped with automatic steam and temperature controls which will maintain any predetermined temperature throughout the day's run. Entirely automatic, sanitary and designed for ready access to the entire length of tubes, making them unusually easy to clean.

Available in single, double or combination tube models.



CRCO
HI-TEMP
JUICE
UNIT

CRCO High Temperature Units eliminate all retorting costs in juice lines. They pre-heat, pasteurize, hold and cool to filling temperature in one continuous operation, the temperature being maintained at proper levels by automatic steam and temperature controls.

Economical in the use of steam due to its regenerative cooling and preheating feature.

THE BEST OF Everything

CHISHOLM-RYDER CO. INC.

Niagara Falls, New York

FOR THE FOOD PROCESSOR

Chisholm-Ryder Company of Pennsylvania
AN AFFILIATE

Ayars Machine Company
A SUBSIDIARY

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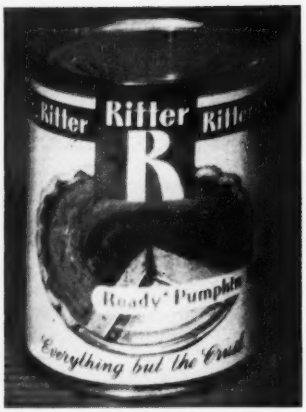


Pumpkin Pie Filling

Ready-to-use pumpkin pie filling has been added to the items now being packed by P. J. Ritter Co., Bridgeton, N. J. Pumpkin, plus all the other ingredients necessary for a filling, are incorporated in the product. Advertised as "Everything but the Crust", it is not even necessary to stir the preparation before filling into the crust for final baking.

Package & Product Shorts

Packaging Adhesives

A new adhesive for case liners has been announced by the Adhesives & Coatings Div. of Minnesota Mining & Mfg. Co., St. Paul, Minn. The adhesive is water-dispersed, eliminating fire hazards and solvent odors. It cures to a water-resistant film, and does not support mold or fungi growth. Application is by brush, spray gun, or roll coater.

Adds Seventh Baby Food Item

Liver and bacon in strained form for babies and chopped form for juniors is now being distributed nationally by Swift & Co., Chicago. It is packed in 3½ oz. cans that provide about two feedings of the strained meat for babies and one serving of the chopped meat for an older child.

Vintage Michigan Apple Juice

Produced from Michigan apples, a new apple juice is now offered by the Central City Pickle Co., Peoria, Ill. under its "Vintage" label. The juice is being bottled in 1 qt. Duraglas containers supplied by Owens-Illinois Glass Co., Toledo, Ohio.

Simulated Crab Shells

Of interest to seafood processors, particularly those packaging such products as frozen crab cakes and seafood patties, are the simulated crab shells now being introduced by Abar Plastics Co., Pittsburgh. These are molded from "Melmac," a product of American Cyanamid Co., New York. Produced in a molded-in ivory color, they are resistant to breakage, convenient to handle and store, and can be easily cleaned by standard washing methods.

—End

Operation Priority

—*Continued from page* 119

farm equipment, fertilizer and such other materials, equipment and supplies as may be assigned.

D. Assisting manufacturers, processors, agricultural suppliers and farmers in obtaining materials, equipment, supplies and credit, including . . .

E. Coordinating activities relating to the development of packaging specifications, standardization and substitution of materials, equipment and supplies listed in Item A above.

Mr. Trigg also assigned to the Food Distribution Branch of the Production & Marketing Administration (Leonard R. Trainer, director) the following functions with respect to the civilian food supply:

1. Determination of food requirements for United States civilians.

2. Acting as claimant for the civilian population in presenting food requirements to the Office of Requirements & Allocations.

3. Participating with Commodity Branches of PMA units in programs to maintain an effective distribution of the food supplies made available to the civilian population under the allocation procedure.

4. Developing and administering programs to meet special or emergency civilian food problems.

5. Maintaining liaison with other departments and government agencies, food-trade representatives and organizations, and others, regarding needs and distribution of the civilian food supplies.

Under the office of Materials & Facilities, the program is divided further into the following operating divisions:

1. *Containers*, John A. Benjamin in charge.
2. *Farm Construction Materials*, Howard E. Emmons in charge.
3. *Chemicals*, Harold A. Shepard in charge.
4. *Fertilizer*, Lewis G. Porter in charge.
5. *Fuel* and *Energy*, Clyde F. Clark in charge.
6. *Processing Facilities*, William J. Howard in charge.
7. *Stockpiling, Barter and Export Control*, Thomas Rawlings in charge.

Under Processing Facilities, the following Industrial Specialists have been appointed:

James E. Bryan, *Fats and Oils.*
Ralph Copp, *Dairy.*
J. Stanford Larson, *Refrigeration.*
John J. McCracken, *Bakery.*
Gerald A. Fitzgerald, *Fruits* and *Vegetables and Canning.*
James M. Murchison, *Meats.*
Middleton P. Barrow, *Sugar.*

Under the Program Staff (Frank X. White, in charge), Bradford C. Reed has been appointed Coordinator of Spot Priorities Assistance.

Portion of the 4,500 sq. ft. of KRAFTILE walls at Wine Growers Guild Winery, Lodi, California • • • Cahill Bros., San Francisco, Contractors

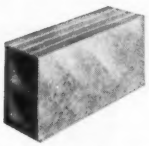
KRAFTILE Industrial Walls

MAKE MONEY BY SAVING MONEY!

FIRST COST IS THE LAST COST ...for walls of KRAFTILE Glazed Structural Wall Units. They never need painting. They're practically scuff and scar-proof. Dirt or grease wipes off with the swipe of a cloth ...yet they can be scrubbed daily with washing compounds or disinfectants without dulling their original beauty.

ATTRACTIVE, EASILY-CLEANED KRAFTILE walls pay *extra* dividends in heightened employee morale, prestige-building impressions on plant visitors. You will be dollars ahead to investigate KRAFTILE Glazed Structural Wall Units before you build or remodel. The facts are yours for the asking; just send the coupon *now*.

KRAFTILE wall specialists will help you plan or figure quantities for any wall construction.



THIS IS A GLAZED STRUCTURAL WALL UNIT—a structural clay tile with a fired-on glazed surface on one or both sides. Available in clear glaze or in attractive colors...a "pre-finished" wall material with these important advantages:

★ **ONE-CRAFT INSTALLATION**—when the mason lays it up, the wall's *finished*—no lathing, plastering, painting!

★ **LIFETIME ATTRACTIVENESS**—never needs painting, can't fade, highly resistant to scratching and scarring. Pencil, crayon, lipstick, grease marks wipe off easily. Unaffected by water, steam, most acids, alkalis.

★ **DESIGNED FOR SIMPLE ERECTION**—wide range of shapes in modular dimensions permits fast installation with minimum of cutting and fitting on the job.

★ **PERMITS STEEL-SAVING REINFORCED MASONRY CONSTRUCTION**—approved installation methods and reinforced masonry will meet earthquake code requirements, use less steel than reinforced concrete!

KRAFTILE CO., Niles, California

( ) *Send my copy of your "Graphic Standards for Glazed Tile"*
( ) *Have your representative call*

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Company _____
Address _____
City _____ State _____

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from solder manufacturing

to shortening!

process men value

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The food processing industries should be acquainted with the above organizations which have been set up in the Department of Agriculture to represent them in any claims to the National Production Authority for special consideration.

The burden is on the food industry to justify its claims for consideration, based solely on *essentiality*. Essentiality is the key to priority consideration. Although an individual claimant may work up a pretty plausible case, the industry as a whole—and, in particular, his branch of the food industry—should make its claims to essentiality felt so as to ease the burden on individual claimants and on that group in the Department of Agriculture which has been set up to help him. In working up a program to justify essentiality, the services of the various commodity branches of PMA are available, as well as those of Industrial Specialists in the Office of Materials & Facilities.

Priority Ratings

To those who may need to apply for a special priority rating for expansion or replacement, the following information should be presented to the claiming agency in the Department of Agriculture before any claim can be initiated:

1. State if previous application has been made for a priority for a particular item or items. If it has, give date of application, to whom it was made and disposition, if any.
2. Give specific detailed information, if any, as to use, type and size of equipment previously used for this purpose.
3. State if it is a replacement. If so, compare capacity of old equipment with new. Give age, condition, type and size of equipment to be replaced.
4. In the case of material shortages, specify materials in which each shortage occurs. (Get information from your suppliers.)
5. Specify the quantities of these materials purchased by suppliers in 1948, 1949 and 1950. (Get information from suppliers.)
6. Specify for all materials and equipment needed for any one project, purchase order numbers, dates and names of suppliers to whom issued. (Get information from suppliers.)
7. Specify names and addresses of suppliers who have refused to supply equipment and/or materials ordered and reasons stated therefor.
8. Specify the date by which the equipment or materials must be delivered and why.
9. Specify names and addresses of suppliers who require a Defense Order.
10. Specify date of delivery promised without a Defense Order.
11. Specify date of delivery promised with a Defense Order.

End (*Resume reading on page* 120)

New Shear-Press

—*Continued from page* 113

ment as shown by the high correlation coefficient between shear-press values and percent-alcohol-insoluble-solids, the correlation between shear-press and percent whites is only 0.66. And the correlation between percent whites and panel results is 0.64. This indicates that percent whites as a measure of maturity and especially of hardness is decidedly inferior to shear-press values on the raw or percent A.I.S. on the canned product.

A determination of percent shriveled beans on the green-seeded varieties is somewhat better than determination of percent whites. However, this correlation indicates that percent shriveled beans is also considerably inferior to shear-press values, in determining the hardness of lima beans for canning.

A determination of percent white beans is of practical importance independently of its value in determining the maturity or hardness of the product in cases where an all-green product is packed. In such cases, white beans could be considered as defects. So it probably would be necessary to determine percent whites in addition to making a shear-press test.

References

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2. A. Kramer, George J. Burkhardt and Hatton Rogers, *The Shear-press, an Instrument for Measuring Quality of Foods. I. The Instrument.*" Md. Agr. Expt. Sta., Submitted for publication, 1950.
3. *A.O.A.C. Official and Tentative Methods of Analysis,* 6th Ed. 1946, Washington, D. C.
4. Gardner Laboratories, *The Hunter Color and Color Difference Meter,* Bethesda, Md. 1950.
5. Z. I. Kertesz, "A Simple Turbidity Tester," *The Canner,* May 20, 1950.
6. *U.S.D.A. Grades for Raw Lima Beans.* P.M.A. Mimeo. Washington, D. C.
7. *U.S.D.A. Grades for Canned Lima Beans.* P.M.A. Mimeo, Sept. 1, 1936, Washington, D. C.

The article above, comprises Scientific Publication No. A307, Contribution No. 2262, of the Maryland Agricultural Experiment Station, Department of Horticulture; partial support from Regional Research and Marketing Act Funds (Project NEM-3).

Special acknowledgment is made of technical assistance and facilities provided by John H. Dulany & Son, Phillips Packing Co., H. P. Cannon & Son, and Libby, McNeill & Libby; and to L. S. Fenn and G. E. Dever, USDA; L. V. Strasburger, Strasburger & Siegel; and members of the industry panel for providing the U. S. grades and panel grades.

End (Resume reading on page 114)

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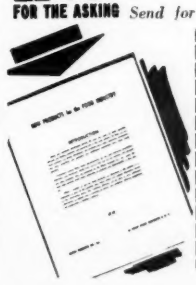

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FE-451

Special Note: First published in 1947, this review of enrichment requirements in the U.S.A. is now brought up to date by the inclusion of milled white rice, the latest grain food to be fortified with vitamins and minerals. This year, the Tenth Anniversary of white bread and flour enrichment, is an appropriate time to publish a new edition of this popular, helpful resume. We shall be pleased to supply extra copies gratis. Just write our Vitamin Division.

The ROCHE REVIEW of enrichment requirements

ALL FIGURES REPRESENT MILLIGRAMS PER POUND

PRODUCT	Thiamine (B_1)		Riboflavin (B_2)		Niacin		Iron	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
Enriched BREAD, or other baked products	1.1	1.8	0.7	1.6	10.0	15.0	8.0	12.5
Enriched FLOUR[1]	2.0	2.5	1.2	1.5	16.0	20.0	13.0	16.5
Enriched FARINA[2]	1.66	–	1.2	–	6.0	–	6.0	–
Enriched MACARONI products[3]	4.0	5.0	1.7	2.2	27.0	34.0	13.0	16.5
Enriched NOODLE products[3]	4.0	5.0	1.7	2.2	27.0	34.0	13.0	16.5
Enriched CORN MEALS	2.0	3.0	1.2	1.8	16.0	24.0	13.0	26.0
Enriched CORN GRITS[4]	2.0	3.0	1.2	1.8	16.0	24.0	13.0	26.0
Enriched MILLED WHITE RICE[5]	2.0	–	*		16.0	–	13.0	–

1. *In enriched self-rising flour, calcium is also required between limits of 500-1500 mg. per pound.*
2. *No maximum levels have been enforced.*
3. *Levels allow for 30-50% losses in kitchen procedure.*
4. *Levels must not fall below 85% of minimum figures after a specific rinsing test described in the Federal Standards of Identity.*
5. *Levels must not fall below 85% of levels shown after washing and rinsing.*

*Omitted in the U.S.A. and Puerto Rico but used in certain Far Eastern countries to a minimum level of 1.2 mg. per pound.

The maximum and minimum levels shown above for enriched bread, enriched flour, enriched farina, enriched macaroni, spaghetti and noodle products, enriched corn meal and corn grits are in accordance with Federal Standards of Identity or State laws. Act No. 183 of the Government of Puerto Rico requires the use of enriched flour for all products made wholly or in part of flour. This includes crackers, pretzels, etc.

The levels for milled white rice are officially those of the Government of Puerto Rico. These levels are commonly accepted in U. S. domestic and export marketing and are based on the recommendation of the Committee on Cereals, Food and Nutrition Board, National Research Council.

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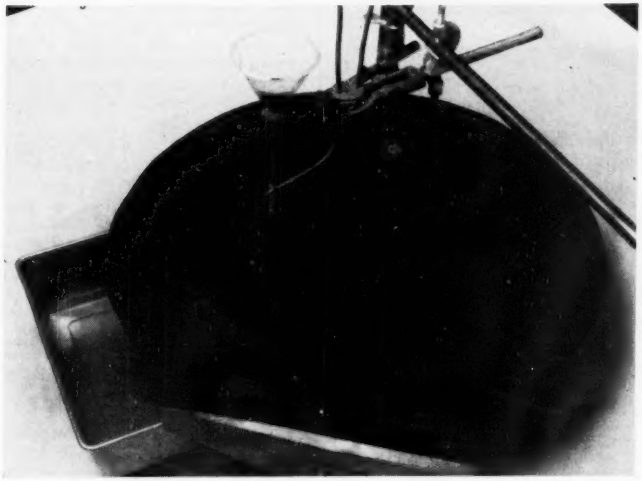

SELECTING truly spherical beads. Slowly revolving disc receives beads from funnel. Then, gentle blast of air starts spherical ones rolling toward pan (left). More vigorous air-blast clears away imperfect beads (foreground).

Glass Beads Used in New Sieve-Calibration Method Assuring More Uniform Crystal Analyses

A simple, rapid procedure for determination of the effective opening size of testing sieves has been developed at the National Bureau of Standards. The new method, which employs calibrated glass spheres of graduated size, may be readily applied by anyone familiar with sieving procedures.

While sieve analyses are widely used in the sugar and other industries for measurement of particle size, discrepancies in results of different laboratories—such as those of buyer and seller—often result in rejected shipments and financial loss. These discrepancies are sometimes due to inadequate sampling procedures, but even with representative samples, or the same sample, differences frequently exist. Apparently, the greatest source of error has been evaluation of size of openings in the testing sieve.

In present methods, size of the average sieve opening is determined from microscopic measurements. This requires equipment and technics many users do not possess. Moreover, for non-uniform sieves, size of the average opening has no significance because the largest openings determine the fineness of material that will pass.

This new method, on the other hand, determines the *effective* opening, that is, the opening corresponding to the largest size of calibrated glass spheres that will just pass the sieve. This means that analyses made at different laboratories, with different sets of sieves, some of which do not conform to specifications, can all be reported with reference to the same openings, and discrepancies which now occur can be greatly reduced.

Evaluation of the effective opening with glass spheres is easily accomplished by sieving a calibrated sample containing a continuous distribution of sphere sizes. The weight percent passing the sieve is evaluated, and the effective opening can then be read directly from a calibration curve supplied with the sample. Once the effective size of each of a set of sieves is known, all analyses made with the set can be corrected by a simple graphical process to give the same values as a set of standard sieves.

Calibrated spheres may be obtained from J. M. Brown, Revere Sugar Refinery, Charlestown 29, Mass.

Digest from "New Calibration Method For Testing Sieves," Technical Report 1501, National Bureau of Standards, Washington 25, D. C.

FATS AND OILS

Iron-Catalyzed Oxidation Retarded by Citric Acid

Citric acid added to peanut oil will neutralize the catalytic effect of iron and prevent oxygen absorption by the oil. Its effect appears to be due both to deactivation of the iron, and to a synergistic effect on antioxidants present in the oil. Citric acid gives little protection if neither iron nor antioxidants are present. The molar ratio required to compensate for iron in peanut oil is about 23 to 1 at levels above 2 ppm. of iron; thus, for 5 ppm. of iron, 0.04 percent of citric acid is necessary.

Digest from "The Effect of Citric Acid Upon the Oxidation of Peanut Oil and of the Methyl Esters Derived from the Peanut Oil," *Canadian Journal of Research* 28, Sect. F, 453-60, Dec. 1950.

Acceptable Shortenings From Weed Seed Oils

Edible oils from weed seeds have been obtained since 1948 at a plant in Fort William, Ontario, using screenings from cereal crops. Of the 38 different kinds of seeds, about ⅔ were wild mustard (Brassica species). Lambs quarter seed occurred in relatively large amounts (3-16 percent). Other abundant seeds were Russian thistle, green foxtail, hare's ear mustard, wild buckwheat, and stinkweed.

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Solvent extraction is used on the cleaned and flaked screenings. After distilling off solvents, the oil is given a mild alkali treatment to promote settling over a period of 48 hr., after which the best quality top-oil is transferred to storage. Constants of the oil are much the same as those of expressed rapeseed or mustard seed oils, but the refining had little bleaching effect. Good results were obtained with bleaching clays.

Edibility tests on the oils showed that they were not as palatable as corn or cottonseed oils when used for salad dressings or for frying, but were generally as acceptable as commercial shortenings. The oils had satisfactory smoke points and good baking properties.

Digest from "Canadian Erucic Acid Oils. V. Physical, Chemical, and Edible Properties of Oil from Weed Seed Screenings" by N. H. Grace, H. J. Lips, and A. Zuckerman, *Canadian Journal of Research*, 28, Sect. F, 401-11, October 1950.

MEATS AND FISH

Movable Shelf Retort Dries Fish Quickly

Cooking and dehydration of fish and meat products are quickly and economically accomplished by processing in a patented retort. The latter is a vertical container, square in cross section, in which a tier of shelves can be lowered and raised. Shelves are jacketed heating elements supported in a framework, and are so connected that when steam is admitted to the lowermost shelf it passes upward through the entire series. The flow is staggered through connections located at diagonally opposite corners of the shelves. Fish, for example, are carried on sheet metal plates or trays which are loaded onto the shelves, beginning with the lowermost and continuing upward as the shelf unit is lowered into the retort. When loading is completed, steam and vacuum connections are made and the cover is securely fastened.

If the fish is to be pre-cooked, vacuum pumps are not operated, but steam is introduced into the shelf system. When the pressure rises to 20 psi. it is held there for 10-30 min., depending on the product being treated. Pressure is released when the flow of steam is stopped, and a vacuum of 29 in. or more is immediately applied. This causes the moisture in the product to boil rapidly at the existing temperature of 212 F. or over. As the process nears completion, a check is made on the moisture content of evacuated gases by observing condensation in a glass connection in the vacuum line. When no condensation appears, process is finished and product

is bone dry. Vacuum is then broken, the shelf unit raised, and product removed for packaging.

Digest from U. S. Patent 2,507,891, issued May 16, 1950, on an application dated May 27, 1944, to V. M. David, Vancouver, B. C., Canada.

Better Cured Pork From Rested Pigs

Meat quality is influenced by the physical condition of the animals before slaughter. If pigs are slaughtered in a fatigued condition, muscles have a lowered glycogen reserve and the post-mortem development of lactic acid is less than for muscles from animals in a rested state. Meat from fed animals will produce sufficient lactic acid to give them a pH of about 5.3 while that of fatigued animals will be around 6.0 or even up to 6.6.

Meat of low pH retains its red color better, contains less sodium nitrite after curing and is less susceptible to the action of spoilage bacteria. If the meat is heavily smoked, color differences will be less important, but for Wiltshire bacon, or other unsmoked products, the quality will be improved by proper pre-slaughter handling of the pigs. Animals fed 22 to 6 hr. before slaughter showed an appreciable increase in liver weight. Glycogen content of the livers of fed animals were 88 mg./g. compared to 0.45 for fatigued animals. The psoas muscle of fatigued animals had 2.75 mg. of glycogen per g., compared to 1.26 in fatigued animals.

Digest from "Effect of Ante-Mortem Treatment of Pigs on the Quality of Wiltshire Bacon," by N. E. Gibbons and Dyson Rose, *Canadian Journal of Research*, 28, Sect. F, 438-50, Nov. 1950.

DAIRY

Sonic Method Controls Air in Ice Cream

An electro-mechanical system has been patented for automatically controlling the density of ice cream produced in a continuous freezer by regulating the amount of air beaten into the mixture. Method of control is based upon fact that the velocity of sound through a medium is related to its density. As finished ice cream makes its exit from freezer it passes through a conduit of rectangular cross section, on the side of which vibrations may be set up in a flexible plate by means of two oscillators of frequencies differing by as much as 15 percent. One frequency is calculated for resonance when density of ice cream is a little below desired overrun, and the other for resonance when density is a little above standard. Variation of product will set up con-

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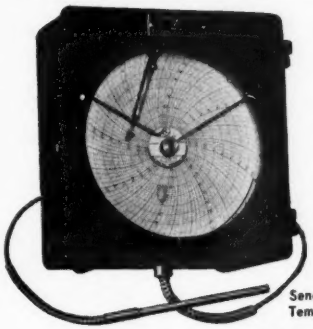

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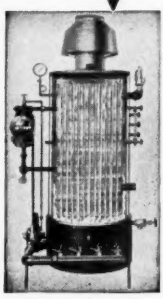

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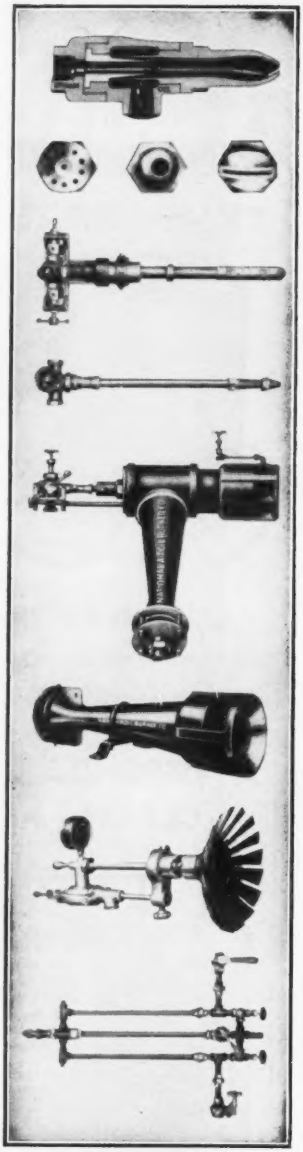

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ditions of resonance on one side or the other, and correspondingly tuned detecting apparatus will identify direction of changing density and provide current to cause an increase or decrease of air supply as may be required.

Digest from U. S. Patent 2,508,152, issued May 16, 1950, on an application dated Jan. 29, 1948, to R. Friedman, Madison, Wis., and assigned to Westinghouse Electric Corp., East Pittsburgh, Pa.

Resistance of Bacteriophage To Acids and Alkalis

Because of the tolerance of bacteriophage to both high and low pH levels, alkaline and acid detergents normally used in cleaning dairy equipment cannot be relied upon to control such infections of lactic acid starters frequently encountered in cheese making.

Tests were conducted with three strains of bacteriophage—HP, No. 6, and W—to study their resistance to both high and low pH values. No inactivations occurred at levels below 11.1, and levels of 11.8 were found necessary to effect complete inactivation of all strains in 1 min. at room temperature. The first evidence of inactivation at low levels occurred at pH 2.72-2.75. However, pH 2.54 was found necessary for complete inactivation in 1 min.

Results seem to indicate that limiting pH values are 11.8 and 2.5 at room temperature. Since effectiveness of alkalis and acids as germicides increases with temperature it is suggested that data should be secured at advanced temperatures before final conclusions are drawn.

Digest from "Inactivation of Bacteriophage of the Lactic Acid Streptococci at High and Low pH levels," by C. C. Prouty, *Journal of Milk and Food Technology*, 329-31, Nov.-Dec., 1950.

CEREAL PRODUCTS

Corn Steepwater Treated To Recover Phytin

Phytin in corn steepwater, consisting mainly of calcium-magnesium phytate, can be precipitated and recovered as a valuable byproduct by treating the liquor with alum at a pH 3 to 5, according to a recently patented process. The precipitate is chiefly aluminum magnesium phytate, and is less contaminated with colored and nitrogenous materials than phytin precipitated by neutralizing steepwater with a base. It is, therefore, superior for production of phytic acid and inositol. The liquor is an excellent medium for production of penicillin, non-toxic, and lighter in color than untreated steep-

(*Continued on page* 195)

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water concentrated to the same degree, or equally concentrated liquor from which phytin has been precipitated by an alkaline agent. In operating the process, ordinary granular alum, up to about 20 percent by weight of the steepwater solids, is stirred into the liquor at a pH 4 and concentrated to about 15 deg. Bé. Mixture is heated to about 70 C. to promote precipitation, filtered while hot, and washed with warm water. Wet filter cake may be used as is, or dried. Liquor is concentrated under reduced pressure to a density of 30 Bé. Precipitation of lactic acid salts will occur during concentration, and may be filtered or centrifuged before use for some purposes.

Digest from U. S. Patent 2,515,157, issued July 11, 1950, on an application dated Dec. 8, 1945, to G. W. Parsons, Decatur, Ill., assigned to A. E. Staley Mfg. Co., Decatur.

FRUITS AND VEGETABLES

Concentrating Fruit Juices Without Loss of Flavor

Two vital factors in the concentration of liquid food products such as fruit juices are speed of operation and recovery of the ingredients that impart flavor to the product. Both are embodied in a patented apparatus and method for the evaporation and concentration of fruit juices. Freshly prepared juice flows to a high-vacuum concentrating column which discharges a heavy concentrate to a high-vacuum flash-pasteurizer. Volatile flavoring constituents of the juice are drawn from the concentrating column into a high-vacuum ester-recovering fractional condenser. Both the ester condensate and the concentrated juice are delivered separately to a can filling apparatus where properly proportioned quantities of each are discharged into cans. The ester condensate is discharged first and blanketed by the heavy concentrate, effectually preventing escape of the flavor ingredients in the short interval before the can is hermetically sealed.

Digest from U. S. Patent 2,512,513, issued June 20, 1950, on an application dated Jan. 15, 1945, to George G. Zahm, Buffalo, N. Y., assigned to Hurd Corp., New York City.

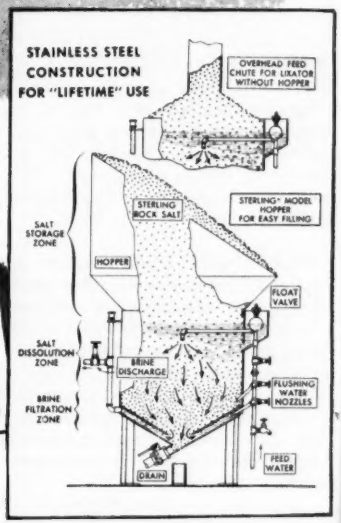
Dried Vegetables Improved By Hot Water Immersion

Preliminary removal of the natural waxy coating is crux of a patented process designed to avoid some of the disadvantages and shortcomings of conventional methods of treating vegetables with a sulphite solution prior to blanching. In this process, vegetables destined for dehydration are immersed

BRINE! EXACTLY RIGHT WITHOUT MEASURING or STIRRING

JUST TURN IT ON!

STERLING ROCK SALT
BRINE DELIVERED BY PIPE
TO EVERY POINT IN YOUR PLANT
• FLAVORING • WASHING • SOAKING
• BLANCHING • GRADING • BRINE PEELING
• ZEOLITE WATER SOFTENERS • PICKLING



HOW LIXATOR WORKS

In the dissolution zone—flowing through a bed of Sterling Rock Salt which is continuously replenished by gravity feed, water dissolves salt to form 100% saturated brine. **In the filtration zone**—through use of the **self-filtration** principle **originated by International,** the saturated brine is thoroughly filtered through a bed of undissolved rock salt. The rock salt itself filters the brine. Nothing else is needed.

WHAT THE LIXATOR PROVIDES

- ✓ **Chemical and bacterial purity to meet the most exacting standards for brine.**
- ✓ **Unvarying salt content of 2.65 pounds per gallon of brine.**
- ✓ **Crystal-clear brine.**
- ✓ **Continuous supply of brine.**
- ✓ **Automatic salt and water feed to Lixator.**
- ✓ **Inexpensive, rapid distribution of brine to points of use by pump and piping.**

Savings up to 20% and often more in the cost and handling of salt have been reported by many Lixate users. Why not investigate?

• Say good-by to "guesswork" and bother! You can eliminate shoveling, hauling, and laborious hand stirring of salt and water—with International's Lixate Process for Making Brine. Assures accurate salt measurement every time. Stops waste through spilling. Saves time and labor.

• The Lixator *automatically* produces 100% saturated, free-flowing, crystal-clear brine which may be piped to as many points in your plant as you wish—any distance away—by gravity or pump. YOU SIMPLY TURN A VALVE to get self-filtered LIXATE Brine that meets the most exacting chemical and bacterial standards.

An INTERNATIONAL Exclusive

The LIXATE* Process

FOR MAKING BRINE

*REG. U. S. PAT. OFF.

INTERNATIONAL SALT COMPANY, INC., Scranton, Pa.

A. E. STALEY MFG. CO. FINDS ANSWER to

Starch Conveying Problem

with

SPROUT-WALDRON PNEU-VAC SYSTEM

PROBLEM: To convey starch products from spray chamber to packing area. Capacity required—2000 lbs./hr. Products are hygroscopic, tend to pack and lump when exposed to high humidity air. The conveying system is used for several different products; must be self-cleaning to avoid hold-up.

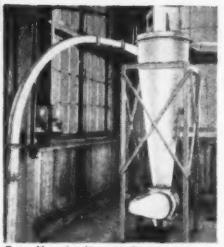
OPERATION: Dried products are discharged from drying chamber through rotary feeder valves to a 4" stainless steel Pneu-Vac pipe line. The Pneu-Vac elevates material to cyclone collector which feeds scalping screen at packing station.

Conveyor air is filtered, dehumidified by cooling, then reheated to obtain necessary low relative humidity. Operational control of the entire system is completely automatic.

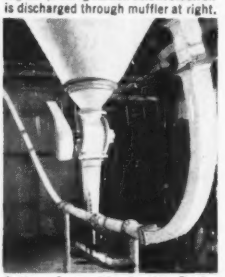
Dust which escapes the cyclone collector returns to the primary drying chamber.

RESULTS: Continuous removal of product from drier chamber is accomplished without danger of foreign matter contamination, or mixing of various products. Stainless steel construction insures product cleanliness. Loss of hygroscopic materials due to packing or sticking to conveyor surfaces is eliminated.

If you have a bulk materials handling problem, talk it over with Sprout-Waldron. PNEU-VAC may prove to be the most efficient solution. Write today to Sprout, Waldron & Co., Inc., 35 Waldron St., Muncy, Pa.



Pneu-Vac pipe line at left conveys product to collector where it discharges by gravity through feeder valve to screening and packing station below. Clean air is discharged through muffler at right.



Bottom of spray drier chamber. Feeder valve discharges starch products to 4" stainless steel Pneu-Vac pipe line.

Product from collector drops to vibrating screen and then to packing bin, from which it is drawn off in drums and multi-wall bags. Pneu-Vac pipe line carrying product from drier to collector is shown in upper left.

LOOK TO SPROUT-WALDRON for BETTER PROCESSING EQUIPMENT

Sprout-Waldron

Manufacturing Engineers

SINCE 1866

MUNCY • PENNSYLVANIA

176

in hot water for a brief period. This removes from uncut surface tissues their waxy or oily protective coating, and conditions surface to retain uniform layer of cold sodium sulphite solution.

Among advantages claimed for new process are: Brighter and more attractive appearance; less brittleness when dry; longer storage life and more pleasing appearance and higher nutritive values when cooked and served. Another aspect of the patent lies in adding to the product during or after drying, vitamins, wetting and dispersing agents, antioxidants, iodine and various other minerals and edible substances that will enhance value of dehydrated vegetables.

Digest from U. S. Patent 2,509,719, issued May 30, 1950, on an application dated May 14, 1944, to C. Birdseye, Gloucester, Mass., assigned to Dehydration, Inc.

CONFECTIONERY

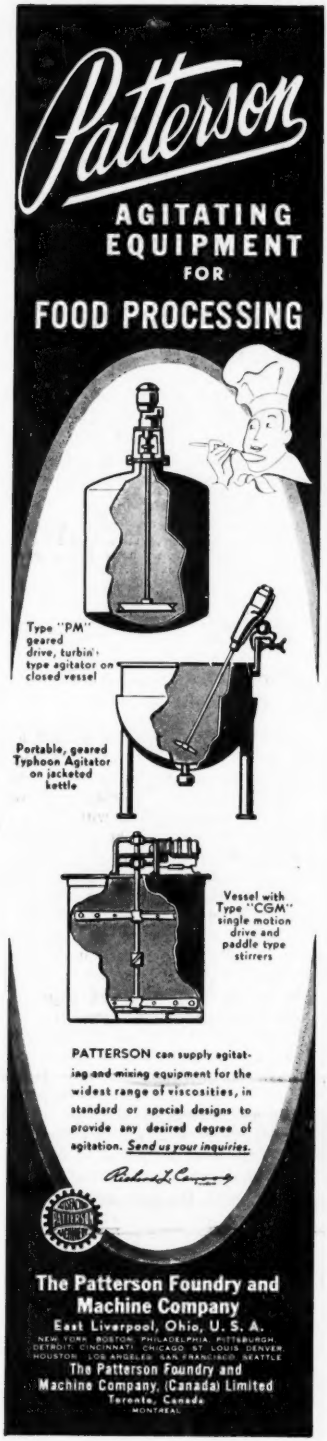
Improved Conche

According to a recently patented invention it has been found that a single vigorous pressure can be substituted for a succession of slight pressures in processing a mixture of cocoa mass and sugar to a plastic consistency. Where formerly this result was accomplished by grinding with several edge runners, the present invention achieves the same result with a single pressure of the order of 200 kg. per sq. cm. in a worm tube. Chocolate raw materials are fed into one end of a horizontal tube within which a worm, mounted on a rotating shaft, moves mixture from feed to discharge end. Pressure exerted in this manner may be increased by letting pitch of thread of the worm decrease in direction of discharge end. Latter is fitted with nozzles, holes, or slots through which mixture is expressed in plastic condition. A piston cylinder may be used for the purpose instead of a worm tube.

Digest from U. S. Patent 2,515,150, issued July 11, 1950, on an application dated Sept. 12, 1947, to K. C. S. Aasted, Gentofte, Denmark.

Low-Fat Cocoa Powder Made by New Process

Preparation of a relatively low-fat cocoa with a fully developed chocolate flavor, using propylene glycol to permeate the cellular walls of the cocoa powder and expel the fat, is one of the objects of a patented process. The method is said to be superior to the conventional process of crushing, grinding and pressing cocoa beans in a hydraulic press. Low-fat cocoas thus produced usually have a poor flavor


Patterson
AGITATING EQUIPMENT FOR FOOD PROCESSING
Type "PM" geared drive, turbine-type agitator on closed vessel
Portable, geared Typhoon Agitator on jacketed kettle
Vessel with Type "CGM" single motion drive and paddle type stirrers
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The Patterson Foundry and Machine Company, (Canada) Limited
Toronto, Canada
MONTREAL

Let's Make the Most of Our Productive Might

THE productive might that has given America the most fruitful peace-time economy in history—the productive might that has backed to a victorious limit in two twentieth-century wars the fighting men who inevitably are our first line of defense—is facing an even greater test. It must not—it cannot be wasted!

The era of fighting and winning wars, and settling back during interims to "business as usual," is past. When it passed, how it passed, doesn't matter. What does matter is that from here on in, perhaps, there'll be no more "indolent" years—no more building of bathtubs to the exclusion of battleships; no more butter at the expense of bombs.

But America's unmatched productive might is fully capable of building bathtubs *and* battleships, of providing butter *and* the bombs requisite to war or to prevention of war; capable, that is, if properly employed—if none of it is wasted.

More And Better Tools Needed

THIS means that the manpower and womanpower left to industry after military needs have been satisfied, must be given every cost-cutting tool, every time-, labor- and muscle-saving aid known to man. It means that these tools must be employed intelligently and efficiently.

At the Fourth National Materials Handling Exposition,* to be held in the International Amphitheater in Chicago, April 30—May 4, 1951, the CLARK EQUIPMENT COMPANY'S INDUSTRIAL TRUCK DIVISION, along with several hundred other producers of materials-handling equipment, will show to industry the newest, the most efficient and the most effective tools in the world for *making the most of America's productive might*. It is a show that no industrial executive can afford to miss—it is the MUST of the Industrial Show year. It is a MUST not only from the point of economy and profits within your own operation—but also from the point of *accomplishing the vast production necessary to the new Military Economy without imposing harsh austerity on the Civilian Economy.*

More Power For Manpower—In Action

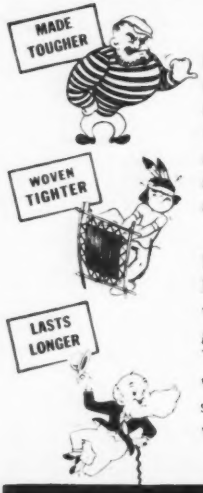
CLARK will show and demonstrate its full LEADERSHIP LINE of fork-lift trucks, powered hand trucks and industrial towing tractors. Among them will be several machines never before shown—some of them not yet in production. The exhibit also will present special handling attachments of proved worth, and demonstrations of their rich usefulness.

By all means attend and study this tremendously important show. And make a special point of seeing the CLARK exhibits and demonstrations of the best machines in their field for giving MORE POWER to MANPOWER.

*(*We'll be glad to supply registration admission tickets. Just address your request to the Clark Equipment Co., Industrial Truck Division, Battle Creek 14, Michigan, telling us how many you want.)*

(Advertisement)

PLASTEX THE PURE FOOD BELT THAT'S ALWAYS ODORLESS AND EASY TO KEEP CLEAN



Here's the conveyor belt that was specially designed for the *sanitary* handling of food! It's impervious to oils, greases, acids, alkalies and moisture, and can withstand temperatures from —20° to 200°F. PLASTEX won't absorb or exude ANY ODORS and can be easily and quickly cleaned by any method . . . including steam! It's fully pliable, requires no special care and will last longer than *any ordinary, untreated belt!*

Impossible? Oh, no, and here's why: To produce PLASTEX, we take our regular Solid Woven Cotton Belt and cover it with a tough coat of plastic that won't crack or peel. This plastic overcoat just won't give in to acids, alkalies, greases and oils. They can "ride" on Plastex . . . but they can't "dig in." That's why Plastex LASTS LONGER and is always pure, sweet and clean! Ask your mill supply jobber or write us for literature and prices.

BUFFALO WEAVING & BELTING COMPANY
209 CHANDLER STREET BUFFALO 7, NEW YORK
NEW YORK PHILADELPHIA CHICAGO DETROIT SAN FRANCISCO

due to the absorption by the cocoa butter of the aromatic oils developed during the roasting process.

In carrying out the present invention chocolate liquor is treated with propylene glycol, and the mass is kept well mixed for ½ hr. at 90 C. The fluid mixture is then passed to a hydraulic press where 95 percent of the fat is expressed. Some propylene glycol-chocolate extract may also be expressed, but can be readily separated from the cocoa butter and returned to the extracted cocoa. The product thus obtained has a flavor equal to that of the chocolate liquor under treatment, despite its low fat content. It may be used in the chocolate and related industries in the same way that regular cocoa is used, with the advantage of a richer flavor. Or it may be processed to yield an aqueous extract useful in preparing chocolate flavored carbonated beverages and milk drinks.

Digest from U. S. Patent 2,515,794, issued July 18, 1950, on an application dated May 15, 1946, to Edwin Palmer, Baltimore, Md., assigned to Moorehead Mfg. Co., Inc., Baltimore.

BEVERAGES

Addition of Ascorbic Acid Improves Light Beers

Keeping quality of beer as well as its taste, odor, color and foaming qualities are greatly influenced by its oxidation-reduction potential. Dark beers are well supplied with the reductones which keep the rH in the vicinity of 9-11; light beers are lacking in reducing substances and are sometimes fortified by their addition. l-ascorbic acid is one of the fortifying agents that may be used. At the rate of 1.5-3.0g. per hectoliter (6-12 oz. per 100 bbl.) it increases the poise number of light beers and improves their keeping quality. Since the rH of beer, as well as of other foods and beverages is difficult to measure directly, the indicator-time-test (ITT value) of Gray and Stone is a practical and effective substitute. The poise number of a beer is defined as 10,000 times the reciprocal of its ITT value. For light beers, untreated with ascorbic acid, the poise number is 5-10. l-ascorbic, in the amounts suggested, increases the poise number to 100-200, and protects the beer against both oxidation and reduction changes such as those exerted by sunlight. Ascorbic acid has no effect on the beer's taste.

Digest from "The Influence of l-Ascorbic Acid on the Poise Numbers of Different Worts and Beers" by Fritz Knorr, *Schweizer Brauerei-Rundschau*, 61, 12, 203-05, December, 1950.

—End

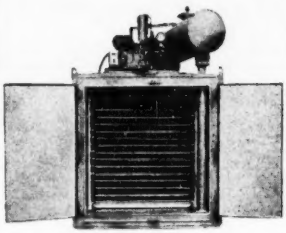
USERS SAY

For Economical Freezing At It's Scientific Best—It's

Amerio

CONTACT PLATE FREEZERS

(Patent Applied For)



Illustrated Model B 15 Stations

S - P - E - E - D - Y

Economical Uniform Packages

Practical Processors Prefer

Amerio Freezers

for their all around efficiency.

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Union City, N.J.
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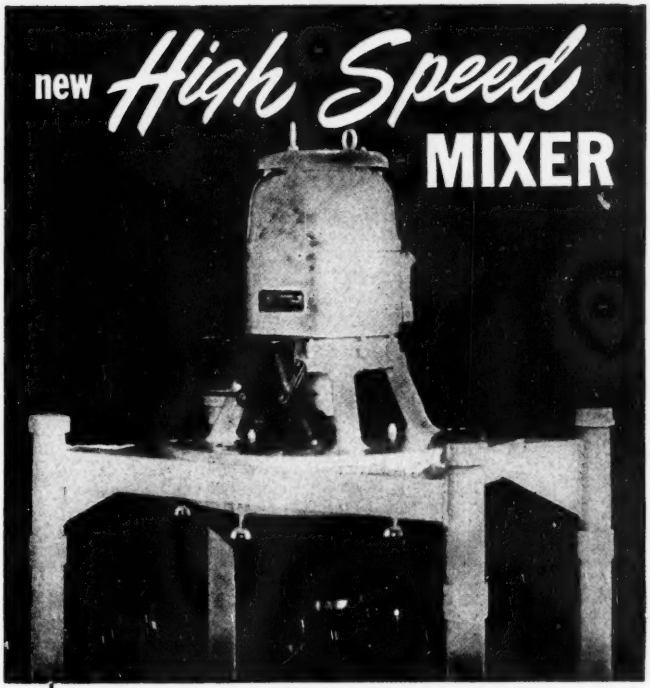

Improves Food Processing

BATCH OR CONTINUOUS MIXING

Homogeneous mixing is now obtainable for food products in faster time . . . at less cost . . . with the "ENTOLETER" Mixer. Amazing savings have been effected in processing time. One company has been able to reduce its mixing cycle from 2 hours to ½ hour.

The saving in mixing time is usually accompanied by a smoother, more intimate mix, permitting improvement in product quality. The high-speed centrifugal action thoroughly disperses materials, producing a remarkably smooth textured product.

The "ENTOLETER" Mixer requires only 12 cu. ft., with capacity of 12,000 lbs. of finished mix per hour. This equipment destroys all stages of insect life where beetle or similar insect infestation may be present. Mail coupon today.

ENTOLETER DIVISION
The Safety Car Heating & Lighting Co., Inc.
P.O. Box 904, New Haven 4, Conn.

Please send bulletin describing the "ENTOLETER" High-Speed Mixer

Name .....

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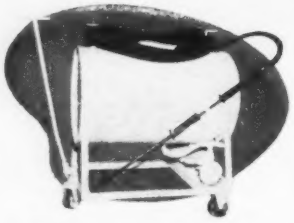
Foreign Distributors: Henry Simon Ltd., Stockport, England



Use the Oakite Hot-Spray Unit to clean:

- Smokehouses
- Bread racks
- Cooling channels
- Kettles, tanks, tubs
- Storage rooms, cellars
- Ceilings, walls, floors
- Potato chip machines
- Butter printing machines
- Rotary loaf ovens
- Skylight windows
- Refrigerated trucks

Much faster, more thorough than scrubbing, brushing, scraping—there's no doubt about the amazing cleaning performance of the Oakite Hot-Spray Unit.

For instance: Cleans completely clogged unit heaters in sausage room in just 12 minutes—and saves $100. Unit cleans refrigerator truck interior without scrubbing—frees 2 men for other work.

Here's how: Just make up cleaning solution in tank of Unit. Heat. Turn on motor switch, open valve—and start spraying. Unit hits dirt with heat, force, powerful cleaning action—discharges up to 1¾ gallons of solution a minute under 30 pounds pressure.

It speeds cleaning because you can spray up to 18,000 square feet in half-an-hour. Unit wheels anywhere—cleans equipment in place, without dismantling. That means less downtime . . . more production.

FREE details on request. Ask your local Oakite Technical Service Representative. Or write address below. No obligation either way.

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS • METHODS • SERVICE

OAKITE PRODUCTS, INC., 26G Thames St., NEW YORK 6, N. Y.

Technical Service Representatives in Principal Cities of U. S. & Canada

Engineering Did It

—Continued from page 109

the loose casings travel between these rolls and drop into a waste receptacle.

Frankfurters continue onto a horizontal stripper roll. Here, any remaining loose pieces of casing adhering to the meat are removed by the knurled surface of the roll, and the wieners are then chuted onto a 6-in.-wide rubber belt conveyor that delivers them to the frankfurter-banding machine.

The new 400-lb. per hr. frankfurter-skinning machine requires only two girls to operate. One girl ties stickloads of franks together and feeds the frankfurters into the vibrator and the other guides wieners into the cutter.

7—Switch to Plastic Trays

On the 1-lb. packaging line, polyethylene trays have replaced the former metal ones for weighing the frankfurters.

The company found four worthwhile advantages in using the new trays: (1) Noise and clatter common with former metal trays has been completely eliminated, (2) workers are also overwhelmingly pleased because the new trays weigh less, (3) cost of the plastic trays is considerably less than the metal ones, and (4) denting and damaging of trays is no longer a problem, because the semi-flexible polyethylene trays are unbreakable.

8—Rapid Defrosting

By using an improved system to defrost frozen hams and bellies in large wooden vats, considerable time and labor have been saved in the curing room.

Defrosting of the meats is carried out by recirculating tap water through permanent overhead pipes into the vats. Directly above the center of a double-row of vats is a supply line that feeds header pipes. Coming from each header pipe are two discharge pipes, each serving a separate vat. There are shut-off valves on the discharge pipes and the supply line. Now, all a worker has to do is open and close valves.

In the old way, the worker used a rubber hose to fill the vats with warm water. He had to remove the hose from a rack, carry it to the different vats, fill them with water, and then coil the hose around the rack.

9—Purification of Brine

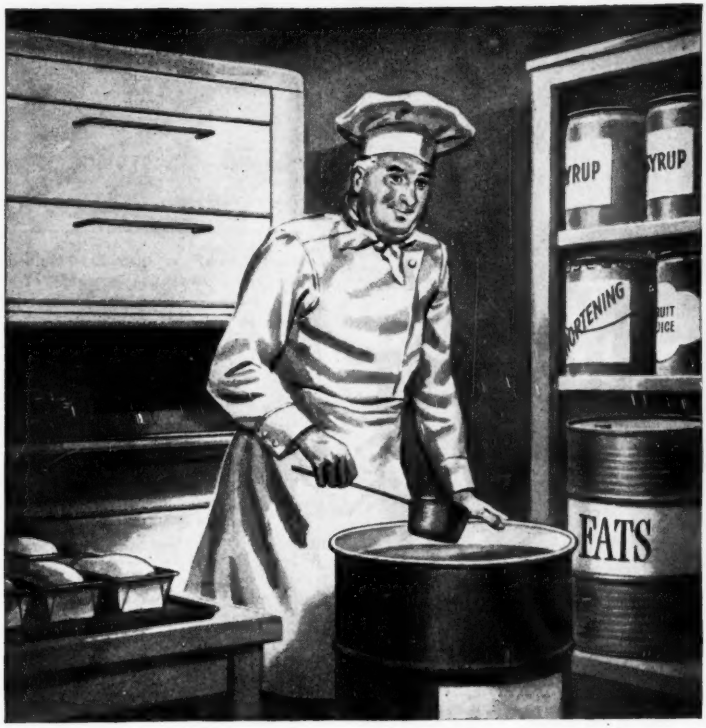
Installation of an economical curing-pickle filtration system—the final change—was made to simplify pickle handling and to prevent contamination of meat by foreign matter.

Employed is a six-tube stainless-steel filter with 2-in. inlet and outlet.

Let J & L Steel Drums and Pails

help Your Products Sell Themselves

J&L STEEL



Representative samples of J&L's complete line of steel shipping pails showing (top to bottom) the ring seal, closed head and lug covers.

Your quality product and a J&L container are a combination that you can be doubly sure will catch the customer's eye. Besides affording maximum protection against damage or contamination, J&L Steel Drums and Pails offer an opportunity to add measurably to the sales appeal of your product. Our artists are at your disposal to assist you in creating a distinctive, decorative package.

We can provide all types of Closures, Finishes and Decorations

Heavy-duty ICC Drums	Light-gage Drums 55, 30 and 15 gal. capacity and 100-lb. Drums	Lightweight Drums for Chemical and Powdered materials	Steel Pails for Foods, Chemicals Oils—1-10 gal. cap.

Why not write for a free copy of our booklet "It's Safer to Ship in Steel." It will give you important information on J&L Steel Pails and Drums.

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Please send me a free copy of your booklet, "It's Safer to Ship in Steel."

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Company_____

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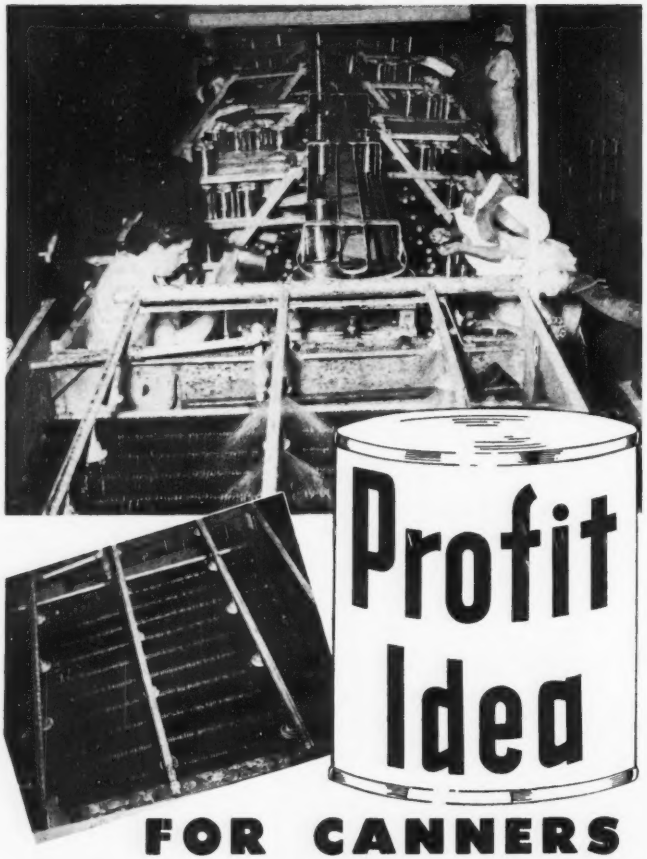


FOR CANNERS

The *Same* FULLERGRIPT BRUSHES
Clean *Different* Fruits and Vegetables

At the Hickmott Canning Co. in Antioch, California, apricots came in so soon after the asparagus season there was no time to set up new cleaning machinery. It was decided to run the apricots through the asparagus machine.

This idea worked. In the machine were Fullergript power brushes which imparted a very high shine to the apricots, so that brokers were "elated with the results".

The same Fullergript brushes *can* and *will* do a good cleaning job on different kinds of fruits and vegetables. You also want to remember that Fullergript brushes, which have their brush material anchored in a continuous metal channel, are much more dense, consequently serve you longer, at less expense.

If you are not enjoying savings that Fullergript makes possible, why not find out what Fullergript can do for you by writing to:

Power Driven
FULLERGRIPT BRUSHES
FULLER BRUSH CO. INDUSTRIAL DIVISION

3640 Main St., Hartford 2, Conn.

The filter units, which are removable, consist of purified cellulose fibers spun to a yarnlike roving and wound in honeycomb pattern on open metal-supporting cores to form a network of diamond-shaped filtering tunnels.

The filter, developed by Commercial Filters Corp., Boston, has been placed between the pickle-storage tank and the overhead manifold feeding the 16 pickle-injecting stations. Capacity of the unit, which operates under 100 psi., is 600 gal. per hr.

End (Resume reading on page 110)

"Scratch—to $15,000,000"

—Continued from page 104

name, "masa," is then hand-molded into cylindrical shaped cartridges of a size acceptable by the automatic extrusion press.

Comprised of two cylinders that alternately feed to the extrusion head, this hydraulic press, the latest developed by the company, provides a continuous flow of product to the cooker. Each cylinder has a red warning light which flashes when it is empty (piston in the withdrawn position). The operator then feeds a cartridge of masa into the empty cylinder through one of the two openings at the top of the press. The piston returns and automatically forces the dough into the cylinder and out through the die head in ribbon form.

Hydraulic pressure of 800-1,000 psi. is required to extrude this viscous material. The ribbons are extruded from 35 slots, arranged around the periphery of the circular head. Of predetermined thickness, the ribbons are automatically cut to a length of about 2½ in., then go in cooking vat.

The vegetable oil in this enclosed cooker flows in an elliptical shaped channel, being kept in motion by a motor-powered paddle wheel. The temperature of the oil is maintained at a constant degree by an automatic, recording temperature control. A measured flow of oil is continually added in the channel to replace that absorbed by the product.

Moving with this flow, the product enters at one end of the cooker, travels around the channel, and is removed by a stainless steel conveyor at the other end. It remains on this conveyor long enough to be drained of excess oil. Automatically salted, it is then dropped upon a vibrating conveyor leading to the automatic scales.

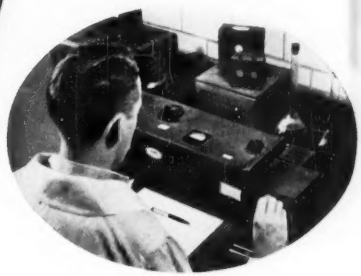
The 65-ft., inclined vibrating-conveyor has two overlapping levels. Fritos are first carried on the top level conveyor to a point just prior to where

(Turn to page 208)

A NEW Source OF CERTIFIED FOOD COLORS*

Sterling's Hilton-Davis Chemical Co. Division, Cincinnati, Ohio, the home of PARAKEET COLORS

A color chemist operating spectrophotometer—one step in our color control to insure quality.



*offers a complete line of Certified Food Colors manufactured by a leader in the color field for 25 years

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Also available in carriers for easy, accurate and economical fortification.

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Roccal—the original quaternary ammonium sanitizing agent.

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This is Why the Nash is the Most Simple Compressor

It's the Nash!

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods. Data on these pumps sent immediately on request

No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

Desired delivery temperature automatically maintained.

Slugs of liquid entering pump will do no harm.

75 pounds in a single stage.

NASH ENGINEERING COMPANY

313 WILSON, SO. NORWALK, CONN.

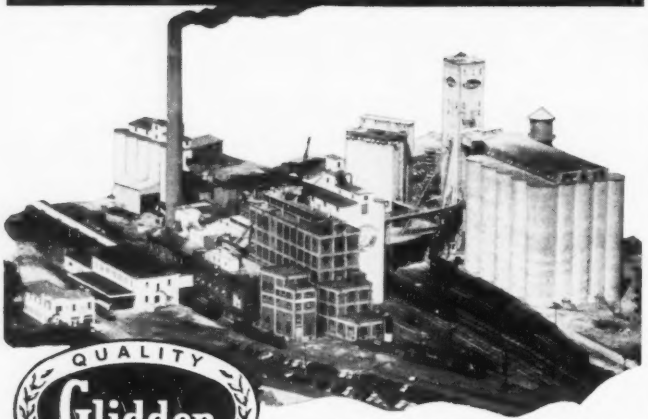
Wm. Underwood Co., pioneer food packers of America, were established in Boston 130 years ago. Their popular spread, Underwood Deviled Ham, has been the delight of epicures since 1865. For many years Taylor Instruments have helped to keep this respected product uniform in quality and flavor.

Now in our own second century, we can help you do the same . . . with instruments for indicating, recording and controlling your food processing. Taylor Instrument Companies, Rochester 1, New York.

Taylor's Centennial
ACCURACY FIRST
SINCE 1851

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

6 DAY FILTERS CONTROL DUST IN THIS SOYA EXTRACTION PLANT



QUALITY Glidden PRODUCTS

The 250-ton-per-day Soybean Extraction Plant of The Glidden Company, located at Indianapolis. The products produced here are degummed and non-degummed soybean oil and 4-Hi Meal.

The Glidden Company has assumed a leading role in the nation's food, paint and chemical industries and today operates 37 plants and two mines in 25 communities. Visualizing the soybean as a vastly important source of raw materials for food, feed, paint and chemicals, Glidden established soybean research and processing plants at Chicago and Indianapolis.

Important in soybean processing is the elimination of the dust problem. For this purpose Glidden chose **DAY** Dust Control systems with highly efficient **DAY** Type "AC" Dust Filters.

6 FILTERS, 4 COMPLETE SYSTEMS INSTALLED IN INDIANAPOLIS PLANT

System one includes one **DAY** Type "AC" Dust Filter installed on the pulverizer grinding system used for grinding toasted flakes into meal.

System two combines two **DAY** Type "AC" Dust Filters operated in parallel for dust control on the bean preparation operations, including de-hulling and the collecting of dust off the flakes before they are transmitted to extraction.

System three consists of the extraction filters. Two **DAY** Type "AC" Dust Filters are connected in parallel and recover dust from the hull cyclone and the meal cooler cyclone.

System four utilizes one large **DAY** Type "AC" Dust Filter which is divided into two sections and located on the track shed roof. Section one collects dust from the bulk meal car loading system; section two collects dust from the grain unloading operations at the elevator.

DAY CAN SOLVE YOUR DUST PROBLEM

Since 1881, The **DAY** Company has specialized in engineering, manufacturing and installing dust control systems. **DAY** engineers are ready to serve you efficiently and economically regardless of the dust situation in your plant.

For complete information about **DAY** Dust Control Systems and the **DAY** Type "AC" Dust Filter, Write-to-**DAY**.

DAY SINCE 1881

The **DAY** *Company*

817 3rd Ave. N. E.—Minneapolis 13, Minn.
IN CANADA: P. O. Box 700, Ft. William, Ont.
Branch plants in Fort Worth, Buffalo and Welland, Ont.

SCRUBBING CORROSIVE GASES ?

Fig. 645

Are your scrubbing nozzles as efficient as you think they could be? Do they resist the corrosion or wear conditions satisfactorily — produce the breakup and distribution you would like?

Outline your spray problem for us—if your liquid can be sprayed with direct pressure at all—Monarch can furnish the nozzles.

NOZZLES FOR:

- OIL ATOMIZING
- HUMIDIFYING
- AIR WASHING
- DESUPERHEATING
- SPRAY PONDS
- MILK POWDERING
- ACID CHAMBERS
- CONCRETE CURING

Write for Catalogs 6-A and 6-C

MONARCH MFG. WKS., INC.
2517 E. ONTARIO ST.
PHILADELPHIA 34, PA.

Questions & Answers

How Would *You* Do It?

Readers are invited to submit to FOOD ENGINEERING answers to questions appearing in this department. Each month one or two questions will be published without answers. Subsequently, answers submitted by readers and selected by The Editors will be presented. Usable answers will be paid for at our space rates. And the person supplying the information will be named, unless he requests otherwise.

What Is *Your* Problem?

Readers also are invited to send in questions. We undertake to provide answers, free of charge, to the best of our ability, to questions pertaining to food processing received from regular subscribers. We do not undertake investigations involving unusual expense.

Inquiries should give the fullest information and data possible. Include your name, not for publication, but as evidence of good faith. The identity of those seeking technical information will not be disclosed.

—The Editors

Preventing Burn-On

Question—In converting a wheat-meal solution by diastase into dextrine containing only 5 percent of maltose, we concentrate the batch in a vacuum pan. In this operation, the solids of the material stick to the steam tubes, forming a coating which reduces the rate of heat transfer. This not only prolongs the concentrating operation but increases steam consumption. What can be done to solve this problem?

Answer—Burn-on, or sticking of the materials to the steam tubes, results from overheating of the material in direct contact with the tube surface. Therefore, one way to correct the condition would be to use a heating coil with larger surface area to give the same total heat transfer with a lower tube temperature. It would also help to agitate the material to keep it circulating over the tubes so that the film in contact with the tubes is constantly changing, and this could be achieved with a propeller agitator or other suitable type of mechanical stirrer.

Use of a higher vacuum in the pan, and a lower heating-coil temperature, is another approach to the problem. This would reduce burn-on without slowing the rate of evaporation. And, of course, installation of a modern continuous evaporator is yet another solution.

Resin Coating of Paper

Question—We are interested in obtaining information on the advantages of using S-Polymer resin coatings for paper.

Answer—While waxes have been used as moisture-resistant barriers when coated on paper, they do lack flexibility, strength and, to some extent, adhesive properties. As modifiers of waxes for hot-melt coating, S-Polymers raise the melting points of waxes, stabilize them against breakdown from heat, improve flexibility and, in some cases, lower permeability to water vapor.

High-polymer concentrations in wax have shown much promise for wax-paper laminates, cellophane coatings and as adhesives for thermoplastic labels. On the other hand, low-polymer concentrations have been used successfully for waxed bread wrappers.

Wax coatings modified with S-Polymers show less tendency to bleed or run when stored at high temperatures. They also miminize chipping.

Hardy-Candy Graining

Question—We manufacture hard candies, with and without filling. Within a short time after these confections are packaged, they lose their color and brilliancy and become granulated and sticky. Can you help us?

Answer—Hard candy is extremely hygroscopic. It readily picks up moisture, which causes the sugar to crystallize. At the same time, the candy becomes soft and the color fades.

The best way to prevent this loss in quality is to package hard candy in a moisture-vapor proof material. And since you do not mention how you package, we list four recommended commercial practices: (1) Packing in sealed cans. (2) Using sealed glass jars. (3) Wrapping in moisture-vapor proof flexible materials, such as a laminated, heat-sealable foil. (4) Packaging in a wrapper with a good moisture barrier and inserting a packet containing a suitable desiccant.

This Month's Problem

Question—How can we preserve prepeeled potatoes which we are shipping in moisture-proof bags to the institutional trade?

No pun intended! This Cambridge woven wire conveyor belt carries cleaned fish through a wash tank to remove scales and scrap so the fish will present an attractive appearance on retail counters.

Cleaned fish are dropped from cleaning table A, onto the surface of conveyor belt B, passing through wash tank C. At the end of the tank hold-down angles change the movement of the belt to a 60° incline. Stainless steel wire, used in weaving this belt, resists corrosive attack of salt water in the wash tank, can be cleaned without damage by steam or by detergents added to the salt water.

In this application, BALANCED BELTING provides low original cost and controllable belt travel. ½" openings in belt weave permit free drainage of wash water and scraps. Angle cleats across the belt hold the fish during the upward movement.

Whatever food you're processing, there's no need to fish around when you want experienced advice on any problem of combining movement with processing. Call in your Cambridge field engineer for his recommendation on the proper . . .

CAMBRIDGE WOVEN WIRE CONVEYOR BELTS—any metal or alloy, mesh or weave. Write direct, or see "Belting-Mechanical" in your Classified Telephone Directory.

FREE BELT CATALOG contains belt construction details, specifications and installation diagrams for many industries. Write for your copy today.

The Cambridge Wire Cloth Co.

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CM METEOR

● Heavy duty electric hoist for stationary, plain, geared or motor driven trolley suspension. Single and two speed models. Capacities: ½ to 5 tons.

Here's Plant Improvement that

Pays off in 3 Ways

HOIST POWER

LOWERS HANDLING COSTS — Picks up raw materials, or finished parts for assembly and moves them along for pennies in power and seconds in time.

ACCELERATES PRODUCTION — Takes the slowing up "lags" out of assembly line movement. One man precision "spotting". Speeds up handling in shipping.

IMPROVES PLANT MORALE — Saves the backs and muscles of men so that they may produce with "morning" efficiency in late afternoon. Aids in accident control.

Frankly, we don't know how many factories have cut costs by putting CM Electric Hoists on production jobs, but we ***do know*** they keep coming back for more and more Meteors and Comets. You couldn't ask for more convincing evidence of a product's usefulness to industry than a constantly growing demand.

CM Meteor and Comet advantages are fully described in the complete CM Catalog. Write us for a copy and the name of your local distributor.

CM COMET High speed, sturdy, portable electric hoist. One hand control. Plug in on single or 3 phase power line. Capacities: ⅛ to 1 ton.

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(Affiliated with Columbus McKinnon Chain Corporation)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.

SALES OFFICES: New York, Chicago and Cleveland • Distributors Everywhere

"Scratch—to $15,000,000"

—Continued from page 202

Cheetos, another company product, are discharged upon the upper level. Here, the Fritos are transferred to the lower level. The vibrating conveyors serve two purposes. They assure high sanitation and, by their vibrating action, cool the hot product as it is conveyed.

The previously mentioned Cheetos are extruded, aerated cereal curls. The prime product, or collette is produced in a separate area of the factory and conveyed to the cooking section. The Cheetos are first placed in a deep fryer and cooked in pure vegetable oil. The cooked product is then emptied into a rotating container, where liquid Cheddar cheese is sprayed on. After absorbing the proper amount of cheese, the curls are transferred via a metering-feed hopper to the vibrating conveyor leading to the weighing machines. Packaging operation on the Fritos and Cheetos is identical

Fritos pass from the vibrating conveyor into a metering-feed hopper which provides a uniform flow to a second vibrating conveyor feeding three Airweigh scales.

Sliding trap doors, in this secondary conveyor, are automatically operated by the action of the scales, which are set to weigh 1-, 4-, and 8-oz. of product. At the instant the proper weight tips the balance, the trap door is automatically closed and, simultaneously, the product is blown from the scale-pan by compressed air into a transparent-plastic bag-filling cylinder. As soon as the scale resumes its original position, the trap door is again opened. Because of the nearly instantaneous emptying of the scale-pan by compressed air, these scales have a weight tolerance of 1/16 oz.

The bag-filling cylinders are mounted in series of twelve on turn-tables, each of which rotates counter-clockwise in a movement coordinated with the action of the scale. As product is blown from the scale-pan into a bag-cylinder, the table turns to place another cylinder under the scale-exit. An operator attaches bags to the bottoms of these cylinders. After filling, the bags drop automatically onto a conveyor leading to the heat-sealer.

This latter conveyor is also a vibrating type. It serves to shake the product down into the bag as well as to move the bag to the sealer. A belt conveyor later carries the sealed bags to the casing station. Finally, the Fritos are rapidly moved into distribution by store-delivery trucks.

The laminated glassine bag in which the product is packaged follows specifications developed by the company's laboratory. It provides a satisfactory

moisture-vapor barrier for the product. All bags are temporarily stored in a special room in which the temperature and humidity are carefully controlled.

In addition to running tests on raw materials to determine processing characteristics, the laboratory acts as a quality control and research headquarters for all company owned and licensed plants.

Cleaning Is Thorough

Maintenance of a high level of sanitation—the rule, not the exception, in this plant—is a part of every employee's job. The operating crews are also the clean-up crews. When the plant stops operation at midnight Friday (after following a 24-hr.-a-day working schedule since midnight of the preceding Sunday), the night shift's production crew begins dismantling machines and equipment preparatory to cleaning. Then the Saturday day shift takes over this work from the night shift, and the plant is thoroughly cleaned by 4 P.M. Saturday.

Floors are washed with a mild caustic soda, scrubbed with a detergent, and also cleaned with a high-pressure steam gun. Machines having electrical outlet equipment, switches, etc., are cleaned with carbon tetrachloride.

Personnel Relations

Even before the threat of labor shortages, the company put into effect a generous insurance and pension plan for its employees. This, plus other incentives, has resulted in an extrmely low labor turn-over.

The company pays the entire bill in an outstanding program for employee's life insurance and pensions. Average cost per employee is 21c per employee working hour. All money invested by the company in this plan accrues only to the credit of the insured. Following a restricted period, this money may be withdrawn by the employee if he does not remain with the company long enough to be eligible for final benefits. Employees discharged for some serious cause (for instance, dishonesty) lose their eligibility for these benefits.

Music While They Work

Management of the company is convinced that the right music at the right time relieves employees of fatigue, cuts down idling and boredom, and generally makes workers more contented on their jobs. Loud speakers installed throughout the plant and offices carry "Muzak" system music, chosen to promote personnel efficiency. the assumption being that music favorably influences a person's working capacity.

The day is begun with a program of

THE BEST GLASS INSULATION IS CELLULAR GLASS...

the only cellular glass insulation is PC Foamglas

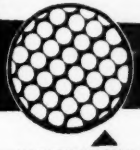
The only material of its kind, PC Foamglas is entirely composed of millions of minute cells of still air enclosed in glass.

In this cellular structure of Foamglas lies the secret of its long lasting insulating efficiency. For still air is generally recognized as an unusually effective barrier to heat travel. And glass is practically impervious to attack by many elements that cause other materials eventually to lose their insulating efficiency.

In walls and floors, roofs and ceilings, on hot and cold piping, on tanks and processing equipment, PC Foamglas has proved its ability to help maintain normal and low temperatures—over unusually long periods of time. That sort of service, plus freedom from costly repairs, maintenance and replacement, makes PC Foamglas—on a cost-per-year basis—the most economical insulation you can use.

When you are figuring on insulation, make sure you have the latest information on PC Foamglas. Our technicians will be glad to consult with you regarding your special requirements. Meanwhile, you will find a lot of helpful data on common uses of Foamglas in our current literature. Just send in the convenient coupon and we shall be glad to mail you a sample of Foamglas and copies of our informative booklets.

These workmen are applying PC Foamglas Insulation to the roof of a processing building at Grape Belt Preserve Company, Westfield, N. Y. Cold storage rooms in this plant are also insulated with Foamglas. Wherever insulation is needed to maintain operating temperatures, PC Foamglas gives efficient, long lasting, trouble-free service.



THIS MAGNIFIED DIAGRAM shows that PC Foamglas is composed almost entirely of still air, which is sealed in minute glass cells. The black areas indicate glass, the white areas air. The insulating properties of still air and the unusual resistance of glass to moisture, chemicals and other elements that cause insulation to deteriorate, make Foamglas an exceptionally effective, long lasting insulating material.

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Please send me without obligation a sample of Foamglas and your FREE booklets on the use of PC Foamglas Insulation for: Commercial, Industrial and Public Buildings ☐. Refrigerated Structures ☐. Piping and Equipment ☐.

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PITTSBURGH PC CORNING ® FOAMGLAS cellular glass INSULATION

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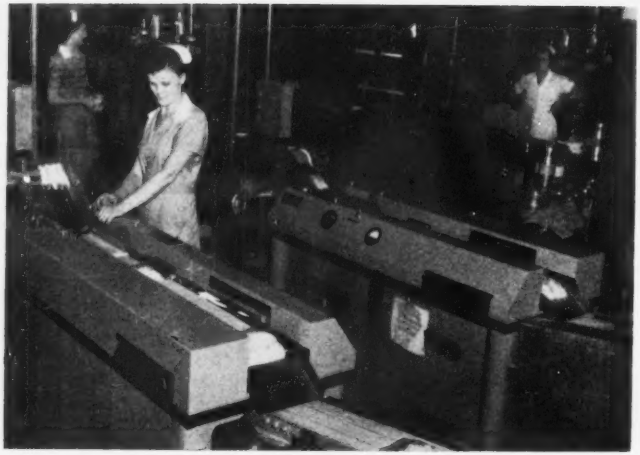

EXACT WEIGHT Selectrols (electronically operated) automatically checkweighing after-dinner mints in the plant of Thos. D. Richardson Co., Philadelphia, Penna.

A Major Factor in Controlling Net Weight . . . .

Controlling net weight depends upon many technical factors, especially in fully processed foods and they vary with various products and with individual industries. Still a major factor however is the control of net weight per package of the finished product. Here is the practical money-saving operation that (1) avoids packaging profits as overweight (2) meeting standard weights and measures regulations and eliminating underweight. This save-dollars operation is EXACT WEIGHT controlled . . . by hand if necessary . . . by semi-automatic means when practical . . . by fully automatic (electronic) application as illustrated above if possible. Rare indeed is the packaging operation today not met by one of hundreds of models of EXACT WEIGHT Scales. You have only to write us about your application.

EXACT WEIGHT Scale Model #213-S, the most popular consumer packaging scale—Features (1) high speed operation due to extremely short platter fall, (1/8") (2) end tower construction which takes up less bench space, and permits, uninterrupted production across the scale while commodities are being weighed all in direct line of vision, 1 lb. beam, notched type. Dial 1 oz. over and under x 1/4 oz. graduation—Capacity to 3 lbs.

EXACT WEIGHT SCALES

Industrial Precision

THE EXACT WEIGHT SCALE COMPANY

910 W. Fifth Ave., Columbus 8, Ohio

2920 Bloor St., W., Toronto 18, Canada

bright "peppy" numbers, followed by subdued tempos until the mid-morning worker's "decline". Then the tempo of the music picks up again to give workers a "musical-lift." During lunch periods they listen to dance tunes, followed by subdued music. Another upsurge in tempo occurs at the time of the mid-afternoon fatigue point, and this tempo is continued until the end of the shift.

A modern lounge room is maintained where employees may spend their rest and lunch periods.

End (Resume reading on page 105)

Palletizing Saves

—Continued from page 101

having the full cases feed onto one common conveyor. Another idea for conservation of labor was installation of remote control switches on the empty case feeders. Now, cases are fed as they are needed, and pushing, tumbling and jamming has been largely eliminated. Otherwise the general layout of the machinery was not disturbed.

With the machinery and warehouse revised, the final step was a pallet truck body. As previously indicated, by the process of elimination and construction of three different bodies, the final body was designed and constructed for all trucks. The ones now in use handle pallets with the greatest efficiency of operation and transit. The pallets with cases fit into one of four compartments, two compartments on each side.

The idea of compartments or partitions was to do away with the shifting or interlocking of cases from one pallet to another. Enough length is provided to each compartment to allow the removal of a pallet in a matter of seconds. The body was sufficiently angled toward the center to prevent cases from sliding off in transit.

For convenience of the driver, a catwalk extends the entire length of the body. And there are handles and steps in proper spacing to allow boarding and disembarking with natural ease. All lights and signals, as well as hand-truck rack, are placed in recessed openings, leaving nothing exposed for easy breakage.

For complete safety of a truck load in transit, a chain, with two levels of connection, was installed for each compartment. Further, small tarpaulins were made to cover each compartment for inclement weather (protection of carry-home cartons).

So, with a workable body, coordination of plant and warehouse, and revision of bottling machinery, the pallet system was considered cost-wise.

(*Turn to page 228*)

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OIL BITTER ALMOND FFPA

Imported from France

FREE FROM PRUSSIC ACID

A product guaranteed for its purity and uniformity . . . suitable for all your requirements.

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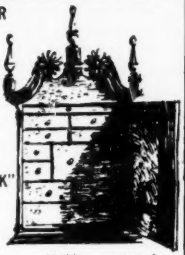

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WHAT part of industry's six billion dollar corrosion bill are you paying? Any amount is too much and can be cut considerably through the installation of saran lined steel pipe. You will find, as have many of the country's leading manufacturers, that saran lined steel pipe means dependable, long term operation. In addition to the excellent corrosion resistance of this remarkable pipe —you have the plus values of rigidity, pressure strength and ease of installation, requiring NO special tools. These advantages are all important to you in the reduction of shut-down time, lost production and equipment replacement.

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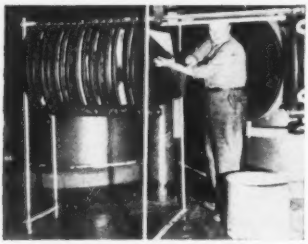

with HERCULES No. 20 FILTER

A big meat packing concern installed a Hercules #20 Pressure-Leaf Filter (200 square foot capacity) to purify lard in a plant that produced 200,000 pounds of lard a day.

A saving of 8¢ per thousand pounds was obtained over the cost of filtering with the old type cloth and plate press method.

This means a saving was made of $16 per day, or $4,800 in a year of 300 working days.

The packer bought this filter because of the many advantages this closed filtering system gives in sanitation, cleanliness, and product quality. The money savings were a bonus.

- Filtration is finer, cheaper, and faster.
- Possible contamination is prevented by elimination of cloths.
- Cleaning reduced to 30 minutes of one man's time, once in 3 days —instead of 2 hours work by 2 men daily. One twenty-fourth the labor cost.
- Half the run is by gravity alone.
- No unfiltered lard is left in the filter at the end of a cycle.

Write for installation details—also for folders describing Hercules self-cleaning and manual Pressure Leaf Filters.

HERCULES FILTER CORP.

Manufacturers of filters for alcoholic and non-alcoholic beverages, sugar solutions, hydrogenated oils, fats, fish oils, gelatine, vinegar, cider flavors, pectin, etc.

210-21st Avenue Paterson, New Jersey

Useful New Books

And Government Publications

Industrial Water Needs and Treatment Given Thoroughgoing Study

WATER TREATMENT FOR INDUSTRIAL AND OTHER USES. *By Eskel Nordell. Published by Reinhold Publishing Co., 330 W. 42nd St., New York 18, N. Y., 1951. 526 pages; 6¼x9¼ in.; cloth. Price, $10.*

Conditioning and treatment of water supplies involve problems that reach every branch of the food industry. And the basic principle as well as specific solutions touch every member of the food plant staff at one time or another.

This book's aim is to provide a comprehensive study on industrial water supplies that will be of practical value to executives, consultants, engineers, chemists and operating personnel. It deals with impurities involving chemical compounds, suspended solids, color, odor and taste. And it follows up with methods of treatment to fit these industrial waters for commercial uses.

Over 1,000 analyses of ground and surface waters have been calculated as to amount of impurities, and the results presented in tabular form.

Water requirements and water treatment practices, in various industries, are likewise thoroughly discussed, as are problems and practices relating to boiler feed waters and cooling waters, the different processes and equipment used in conditioning water. Tables of conversion factors and equivalents along with other important tabular data are also included.

The author has spent over 32 years in the water treatment field and draws from experience in the laboratory, office, plant, and field work. As a chemist, he understands the water problems in the chemical and process industries. And he knows how to present his data so that it can be readily understood by the non-technical executive and worker.

Useful Formulas

THE CHEMICAL FORMULARY. *Edited by H. Bennett. Published by Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y., 1951. 648 pages; 5¾x8½ in.; cloth. Price, $7.*

Food chemists and food engineers might well derive more value from some of the non-food formulas presented here than from those offered for a rather narrow range of food products.

Among the useful formulas, not commonly found in books of this kind, are those in the chapters on adhesives, insecticides, soaps and cleaners, metals and their treatment, lubricants and oils, and colloids.

Helps on Sanitation

PUBLIC HEALTH ENGINEERING, VOL. 2. *By Earle B. Phelps. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1950. 213 pages, 5½x9½ in.; cloth. Price, $4.*

This is an elementary discussion on food sanitation all along the production line. Its title might annoy the professional engineer, at least until he discovers that the subject matter does touch on primary engineering aspects of applying sanitary practices in the food field.

Milk and shellfish handling have been singled out for comprehensive chapter treatment because both offer special problems with major health implications.

Other noteworthy chapters deal with the sources and nature of various poisons developed in foods and with waste disposal problems in the industry.

How Food Is Sold

FOOD MARKETING. *Edited by Paul Sayres. Published by McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y., 1950. 335 pages; 6¼x9¼ in.; cloth. Price, $5.*

Comparatively little information on food marketing has been available in book form. In fact, very little has been written in any form on this subject despite its tremendous importance in the economy of the nation—and in the operations of the food manufacturer.

This book offers an insight into the various functions involved at the marketing level of the food industry. Carrying from the farm, through the processor, and on to the wholesaler,

broker, and retailer, leaders in their fields combine to explain how the enormous volume of food reaches the consumer day after day.

There is a great deal more information packed away here than the size of the book might indicate. Mr. Sayres, and the 21 other authorities who have contributed chapters on their special fields, provide a comprehensive coverage of this complex division of the world's largest industry.

Government Publications

HARVESTING AND HANDLING CITRUS FRUITS IN THE GULF STATES. *U. S. Department of Agriculture. Farmers' Bulletin No. 1763. Price 25c.* A step-by-step description of the processing necessary in delivering citrus fruit in sound condition to consumers in distant States. Canned and other processed products also are discussed.

MARKETING CHANNELS AND MARGINS FOR SOYBEANS AND SOYBEAN PRODUCTS IN ILLINOIS. CROP YEARS 1947 AND 1948. *U. S. Department of Agriculture.* A study of the handling of Illinois-grown soybeans, from the time the harvested beans leave the farmer until they reach the processor. Prepared by the Bureau of Agricultural Economics, USDA, in cooperation with the University of Illinois.

These recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated the pamphlet is free and should be ordered from the Bureau responsible for its issue.

CONSUMPTION OF FOOD IN THE UNITED STATES 1909-48. *Supplement for* 1949. *Department of Agriculture, Miscellaneous Publication No.* 691.

A WATER POLICY FOR THE AMERICAN PEOPLE. *The report of the President's Water Resources Policy Commission, in three volumes. Volume* 1: *General Report, immediately available, price,* $3.25. *Volume* 2: *Ten Rivers in America's Future. Volume* 3: *Water Resources Law.*

WORLD FOOD SITUATION 1951. *Office of Foreign Agricultural Relations. WFP-1-51 Mimeographed.* This circular summarizes the food supply situation in major deficit and surplus producing areas, reviews production and trade of the most essential food commodities for 1950-51, and presents the outlook for winter crops in the Northern Hemisphere. —*End*

Keep up to date

ON NITROGEN IN THE FOOD INDUSTRIES

through LINDE

Day by day, more food processors and packers are turning to high-purity nitrogen to prevent deterioration of their products from oxidation. The improved storage quality of nitrogen-protected foods results in a wider margin of profit through less spoilage.

High-purity LINDE Nitrogen may help improve your product or simplify your process. Some of these LINDE reports may suggest ways to you:

★ **"Gasometry—For Sharper Control of Food Quality"** *Product shelf life improved through control of contained gases.*

★ **"Investigations on the Use of Nitrogen for the Preservation of Perishable Food Products".** *The "how" and "why" of food oxidation deterioration prevention.*

★ **"Where Trim the Oxygen Content".** *Methods for determining where and how to decrease harmful oxygen content of liquid foods.*

★ **"Juice Color is Bettered by a Gas Blanket".** *Nitrogen blanketing of fruit pulping operations. Applicable to vegetable products.*

★ **"Relationship of Headspace and Dissolved Oxygen in Liquid Food Containers".** *Sample calculations and nomographs for determining effective oxygen exclusion.*

★ **"Nitrogen Protection of Edible Oils".** *How to maintain peak oil quality from refinery to consumer.*

★ **"Wrapper Test Promises More Shelf Life".** *Simplifies choice of oxygen-excluding film for effective gas packing.*

★ **"How Nitrogen Protects the Quality of Foods".** *How various processors protect their products against oxidation deterioration.*

★ **"Liquid Nitrogen Pulverization".** *Continuous pulverization of food products, spices, without loss of volatiles, changes in flavor.*

★ **"Practical Factors in Nitrogen Packing Using Flexible Film".** *Machine, film, and packing requirements for prevention of food spoilage.*

Check the reports you want, tear out this advertisement, pin it to your letterhead and mail it to LINDE in New York or to the LINDE office nearest you.

LINDE Nitrogen 99.99% pure is supplied as a gas in steel cylinders, and as a liquid in tank-car and tank-truck lots. The liquid can be used for lightning-fast cooling (—320°F.), or can be converted to gaseous nitrogen as needed at the user's plant.

The term LINDE is a registered trade-mark of Union Carbide and Carbon Corporation.

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Vitamin A

enriches both your products and your profits

LIKE many others, you may find that a fine way to touch off a boom in your sales is to put on your label the words: "Enriched with Vitamin A."

DPi's concentrate, unexcelled among natural materials for freedom from taste and odor, may be just the "something extra" you need to put an upward slant in that sales curve.

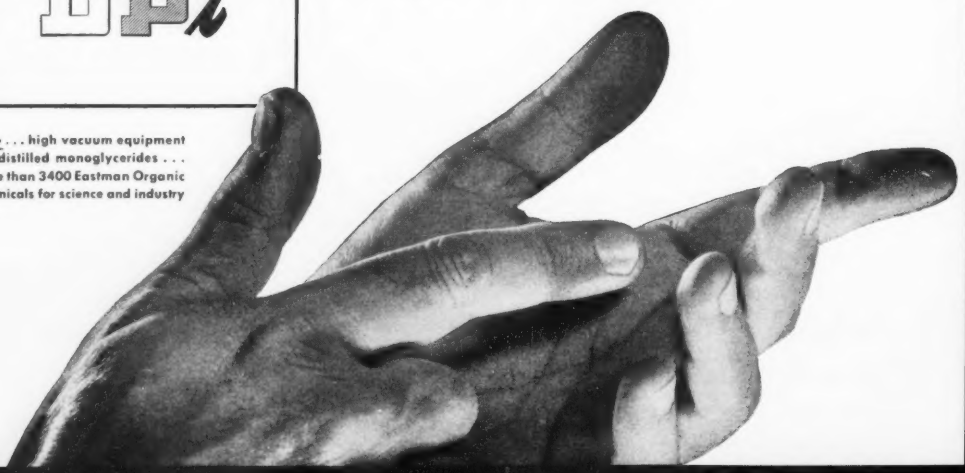
Or you may find that Myvax 16 Synthetic Vitamin A Palmitate is the answer for your particular product.

Natural *or* synthetic—you get the world's finest vitamin A from DPi. Working it into your plant processes is not at all complicated, and the price is lower now than it has been in years. Let's arrange a date at one of our sales offices and go into the details thoroughly. ***Distillation Products Industries,*** 723 Ridge Road West, Rochester 3, N. Y. (Division of Eastman Kodak Company). Sales offices: 570 Lexington Avenue, New York 22, N. Y. • 919 North Michigan Avenue, Chicago 11, Ill. • Gillies & Loughlin, Los Angeles and San Francisco • Charles Albert Smith, Ltd., Montreal and Toronto. "Myvax" is a trade-mark

DPi

leaders in research and production of both natural and synthetic vitamin A

Also . . . high vacuum equipment . . . distilled monoglycerides . . . more than 3400 Eastman Organic Chemicals for science and industry



KEEPING UP WITH THE FIELD

The Facts of Price Spreads

Accustomed to playing whipping boy roles for the food supply line, food processors and distributors have been slow to react to the recent series of attacks resulting from advancing food prices. But with federal officials and labor leaders courting political farm support — and defending their own economic sleight-of-hand — the usual half-truths have been sliced into quarters and eighths. So, at least two associations, National Canners and the Grocery Manufacturers of America have been moved to issue a few facts of commercial life.

Among others in NCA, Nelson Budd, director of information, adds the missing links to Walter Reuther's recent statement that of a 19-cent can of corn the farmer received 2¾ cents, and that "the food processors, the boys who do their farming on Wall St., many times get more out of it than the farmer who owns the land." Budd points out that in the first place the farmer's average out of a 19-cent can of corn is 3½ cents; 7.3 cents pays for the labor and materials involved in packing. 1½ cents goes for transportation most of which is for labor, and the remaining 6.4 cents for wholesale and retail operations, with again a large portion going to labor.

Taking another tack, Paul Willis, GMA president, shows that cost of grains have advanced from 15 to 25 percent since June, 1950, cottonseed oil, 87 percent, cocoa beans 27 percent and manufacturing milk, 19 percent, containers, from 8 to 50 percent and labor in the plant, 10 percent.

And to all this might have been added increased costs of equipment and maintenance, which cannot be absorbed by present narrow profit margins.

Antibiotic Hunt Gets Boost

Subtilin used in conjunction with mild heat will not prevent the growth of *Cl. botulinum* or the usual spoilage types in the low-acid canned foods that are preserved by high-temperature sterilization. Such is the conclusion from laboratory tests reported by C. W. Bohrer, National Canners Assn. research laboratory, at the canners convention.

Subtilin does appear to be effective in inhibiting organisms responsible for flat sour spoilage in tomato juice. This use, however, would be only as insurance against unusual contamination, since normal spoilage organisms are now controlled in conventional canning operations without extraordinary treatment.

While these NCA studies contradict the promising results originally reported by the Department of Agriculture, the association regards the facts that have emerged as a strong encouragement to further exploration of the use of antibiotics in canning.

Cathode Rays Work—But

Cathode rays destroy all microorganisms in food products in a few seconds, and with a temperature increase of only a few degrees F., Bernard E. Proctor, MIT food technologist, told canners at the NCA convention. Packaging medium has no effect on microorganism destruction, provided container is less than an inch thick. Before cathode rays can be of practical commercial use, however, each specific food must be studied, particularly from the standpoint of flavor and color changes.

On the other hand, Dr. Proctor said, sonic vibration, radioactive isotopes, radio waves, infrared radiations, ultraviolet irradiations and x-rays have not been found suitable for food sterilization up to the present time.

Acid Foods Heat Irregularly

Heat penetration data on fruits processed in both still and rotary cookers have been gathering since the start of a cooperative project undertaken in 1949 by National Canners Assn., American Can Co., Continental Can Co., and Food Machinery and Chemical Corp. Charles T. Townsend reported some of the findings at the recent National Canners Association convention.

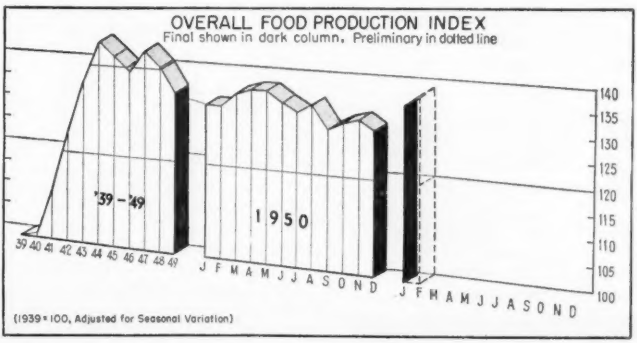
In the case of fruits packed in syrup, there was found to be a break in the heating curve, with a very much slower heating rate after the break than before. The lower the sugar content, the higher the temp at which break occurred, culminating in almost a straight-line heating curve for water packed products. The softer the fruit, the lower the temperature at which the break occurred. For the same initial temperature and the same conditions of packing, the break seemed to occur at about the same number of degrees below retort temperature, regardless of the temperature used. In most cases, with the exception of fruit cocktail, the break in the heating curve was accompanied by a pronounced drop or leveling off in temperature.

Another irregularity noted was the fact that although the heating rate after the break did not change with an increase in processing temperature, the heating rate before the break became more rapid. Taken in conjunction with the drop in temperature at the break, this means that it is not possible from data obtained on one can size at a given temperature to calculate processes for other can sizes, or to calculate processes for other temperatures.

The break in the heating curve with its accompanying temperature drop was found to be caused by floating of the fruit as the temperature rises.

The amount of contamination of the product before processing, which must be considered significant with respect to spoilage, can be determined only by bacteriological surveys in a plant during normal operating conditions, and again when spoilage is occurring.

There is no question but that the contamination of fruits and tomato products is dependent to a large extent on the efficiency and frequency of clean-up operations.


OVERALL FOOD PRODUCTION INDEX
Final shown in dark column. Preliminary in dotted line
'39 - '49
1950
39 40 41 42 43 44 45 46 47 48 49
J F M A M J J A S O N D
J F M A M J J A S O N D
140
135
130
125
120
115
110
105
100
(1939 = 100, Adjusted for Seasonal Variation)

Processing Profit *Stops* With Inefficiency

Whether it's mechanization, materials handling, warehousing, or processing procedures, *efficiency* itself is the *profit factor* in any phase of the food industry.

Ferguson is aware that individual problems require specific treatment, therefore a *Ferguson First Team* . . . men carefully selected for their training and experience — men who work smoothly and effectively together, and *with your organization* . . . undertake first a preliminary investigation into your needs.

After careful analysis of your problems, recommendations for complete plant modernization may be made — the replacement of obsolete equipment, plant expansion, construction of new or added facilities may be advised, to affect increased volume at lower operating costs.

Investigate the Ferguson First Team method of cooperative effort. Preliminary discussions in confidence and without obligation.

THE H. K. FERGUSON COMPANY
ENGINEERS AND BUILDERS
Headquarters:
Ferguson Building, Cleveland, Ohio
District Offices:
New York, Houston, Chicago, Los Angeles, Cincinnati

Puts Profit in Sugar Wastes

Sugar cane milling is getting attention in such widely separated points as Peoria, Ill., Poona, India, and Hawaii with "practical" laurels going to the first for a method of separating pith and fiber of bagasse, the stalk residues left after crushing.

E. C. Lathrop of the Northern Regional Research Lab, at Peoria, hopes the new method will open new industrial outlets for three by-products of sugar cane—bagasse, pith and blackstrap molasses—thus offsetting rising operating costs and increasing profits at the mills.

However, Dr. Lathrop says, profit will result only if the industry itself undertakes the recovery problem. He proposes that the mills separate the pith and fiber from fresh bagasse, dry the fiber and sell it to the paper mills. Then the blackstrap molasses—juice left after extraction of the sugar—is to be absorbed on the dried pith and the mixture sold as an ingredient for livestock feed.

The Indian sugar industry has become interested in the use of the ion exchange process for purifying sugar cane juice, hoping to eliminate the molasses.

In Hawaii a $100,000 pilot plant is getting under way to test produce different kinds of livestock feeds and paper pulp from bagasse that used to be thrown away or burned as fuel.

Warns Against Bakery Wastes

Cooperation of bakery workers to guard against waste and greater efficiency in plant operation, will help maintain present price levels in face of rising costs, Karl E. Baur, president, American Bakers Assn., told the Bakery Engineers at their Chicago convention. He warned that these price levels must be maintained.

Touching on a more specific bakery operation, H. S. Hale, Langendorf Baking Co., San Francisco, told the engineers that partially baked products are by no means a passing fancy. More than 8,000 bakeries are producing these items today, he said. To get the best product he recommended a 275-300 deg. F. baking temp to get 170 deg. internal roll temp. This will assure sufficient product rigidity as well as absence of crust color. He thought that baking powder biscuits, doughnuts and cookies as partially baked items, show possibilities although there are still production and merchandising kinks to be worked out. He emphasized care in avoiding cripples by careful panning and packaging.

Earl B. Cox, Helm's Bakeries, Los Angeles, was elected president, succeeding Don Copell, Wagner Baking Corp., Newark, N. J. Other officers are: Fred Weberpals, H. C. Bohack Co., Brooklyn, 1st vice-president; J. S. Devanny, International Milling Co., Lincoln, Ill., 2nd vice-president; M. J. Swortfiguer, St. Louis, 3rd vice-president; Victor E. Marx, Chicago, secretary-treasurer.

Freeze One-Third of Food?

Frozen food packers and distributors are looking to the day—five to ten years hence—when their product will account for one-third of the total food consumed. Canned and fresh foods will evenly divide the remaining two-thirds. That's what NAFFP president, E. J. Watson, told the all-industry conference in San Francisco,

Hors d'Oeuvres

• *Man in California Department of Agriculture says it costs the state's farmers $1,000,000 a week to keep their crops supplied with commercial fertilizers. Must give the dwindling farm animal population quite a horse laugh.*

• Know how to get a soldier to eat dehydrated foods? A British food minister says to sell his mother or wife on the idea of serving it. Then the soldier will eat it "because its used in his own home." Wonder if in Britain housewives are easier to handle than soldiers.

• *Postum advertising will not hint that drinking coffee increases the divorce rate, or causes business failures, factory accidents, juvenile delinquency, traffic accidents, fires or home foreclosures, according to the National Coffee Assn. Of course, you are supposed to know that if it keeps you awake it's something you ate.*

• *Pathfinder* tells its public about canned water being produced for the Navy by a Boston company. Doesn't pick up taste from can lining, keeps for years, and can be frozen, then drunk on thawing. Guess it could be chewed if you didn't want to bother thawing, but they don't say.

• *USDA is using calchicine—a poisonous drug—in an attempt to produce strawberries as big as peaches, apples as large as grapefruit, and much larger and more succulent vegetables. If it ever works it's going to create some new problems, such as is it polite to cut your pea with a fork.*

• Blurb suggesting promotion capers for baby food purveyors during "National Baby Week" says: "The alert retailer needs no statistics to remind him that the young mother is his most profitable customer." On the other hand, statistics might lean toward older mothers with broods of between 8 and 15.

Frozen, But Not Static

E. J. Watson, president, National Assn. of Frozen Food Packers, forecasts phenominal growth of industry from the current 6 to 7 percent of total foods to 33⅓ percent, within next five to ten years.

though currently, he said, frozen foods account for only 6 to 7 percent of the total.

The industry will be forced into increased prices, this year, due to increases in the price of raw materials. Peas were cited as an example. Packers paid $80 per ton in 1950, compared to the parity price of $99 per ton that obtains this year. Between 1940 and 1950 prices have risen only 20 percent due to better plant engineering, more efficient distribution and increased sales volume.

Direct distribution from packer to warehouse was attacked by the distributors, who noted that they have reduced costs to about equal the trucking and selling costs of the direct method. In the opinion of at least one warehouseman, the direct plan is basically inefficient.

New F&DA Chief

Frank A. Vorhes, Jr., came through the ranks to earn his recent appointment as chief of F&DA's division of food. With the administration since 1928, he served first in the Washington laboratory and later in San Francisco, where he became chief chemist. He returned to Washington in 1948 as chief chemist of F&DA's division of field operations.

Succeeding Dr. Ward Benjamin White, who died February 24, Mr. Vorhes will be responsible for directing the staff food chemists in devising chemical procedures to be used in enforcing the Federal Food, Drug and Cosmetic Act. His division also participates in formulating food standards.

STEEL

Every Kind

Some steel products are in short supply but over-all stocks are still large, diversified

Plates, Structurals, Bars, Sheets, Tubes, etc. . . . Carbon, Alloy and Stainless Steels . . . .

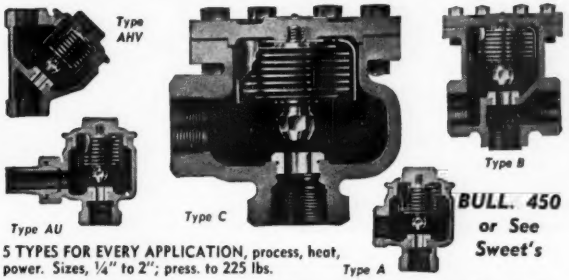
RYERSON

Joseph T. Ryerson & Son, Inc. Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles, San Francisco

Nicholson Steam Traps

CUT HEAT-UP TIME 48%

A large processor recently reduced the heating cycles of cookers from 105 min. to 50–60 min., by substituting Nicholson thermostatic steam traps for a mechanical type. This effected a gratifying production increase of 37%. Reasons for Nicholson's faster heat transfer: operate on lowest temperature differential; 2 to 6 times average drainage capacity; maximum air venting. To learn why an increasing number of leading plants are standardizing on Nicholson thermostatic traps send for our catalog.



BULL. 450 or See Sweet's

5 TYPES FOR EVERY APPLICATION, process, heat, power. Sizes, ¼" to 2"; press. to 225 lbs.

W. H. NICHOLSON & CO., 193 Oregon St., Wilkes-Barre, Pa.

Sales and Engineering Offices in 53 Principal Cities

DC
ANTIFOAM
A
the most versatile
and efficient defoamer
on the market
A
DOW CORNING
SILICONE
PRODUCT
Dow Corning
MIDLAND · MICHIGAN
Write Dept. H today for free sample.

Maintenance Rated High

Food factories can secure priority assistance in getting the needed material of construction, parts and equipment required for maintenance, repair and operation. This sensible policy has been announced by NPA with a very simple explanation:

"We cannot let the need for materials and equipment to build *new* facilities interfere with the maintenance of *existing* capacity. We can afford a few pounds of metal today to keep a machine running rather than several tons tomorrow to make a replacement machine. And this way we avoid the loss of production and employment that would result if we allowed our present equipment to fall into disrepair."

Operating executives and purchasing agents having difficulty will find it necessary to study and work within the provisions of N.P.A. Reg.-4 and N.P.A. Reg.-2 as amended from time to time. As a primer interpretation it may be most useful initially to ask for a press release N.P.A. 303-A which gives questions and answers regarding this matter.

Good Research Advice

Uncle Sam's operators of "Research and Marketing Act" have been told by the Vegetable Advisory Committee how to judge future vegetable research programs. The committee says:

"Inasmuch as results of basic research are widely applicable to problems in all sections of U. S., we recommend that work of USDA be directed more specifically to fundamental research to discover basic and underlying principles, and that general development and application of such principles be brought about largely through subsequent work by experiment stations and industry."

To the food processor this makes good sense, for it keeps government effort in the fundamental area and leaves practical jobs for practical folks of industry.

Car Shortages Vex Millers

Flour millers are beginning to wonder how long they are going to have to put up with curtailment of production due to box car shortages. After intermittent shortages during the past six months, the situation picked up real steam in late February when the Buffalo plants of General Mills and Pillsbury shut down while Russell-Miller and international Milling cut output drastically. Smaller mills in Colorado, Kansas, Washington, Idaho and Oregon have also been losing production, though such major centers as Kansas City and Minneapolis had not been too seriously affected.

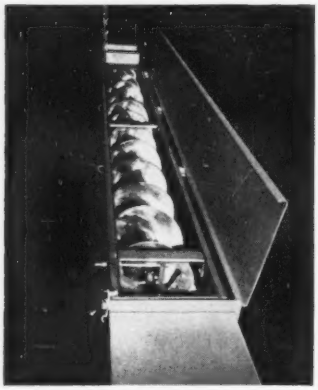
It may not take too much of this to prod someone into the development of truck bodies for bulk shipments of flour.

Pressure on Byproducts

In a new bulletin, "Citrus Cannery Waste, Its Use and Disposition," the U. S. Department of Agriculture points up a potentially large source of livestock feed and other useful products, such as lactic acid.

About 2,500,000 tons of citrus waste—including peel, pulp, and seeds—is produced every year. Although

PROVED IN OPERATION!
Rietz TL THERMASCREW STEAM BLANCHER
For puree lines, nectar, baby food, juice — or wherever steam blanching is used.



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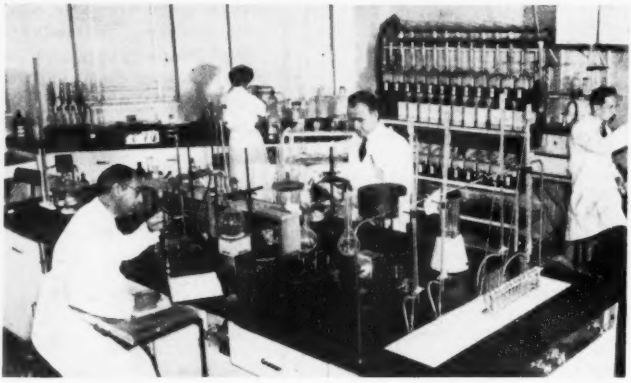

Australians Study Bread

Australian bakers maintain a bread research institute at North Sidney, N. S. W., through a self imposed levy of one shilling (about 12 cents) on every ton of flour used. Institute has about 2,500 members in all parts of the country. Pictured here is the Institute's chemical lab where most of the institute's interests are centered.

"YOU SAID TO REMOVE ALL THE SCALES BEFORE WE STARTED PACKAGING THE FISH."

much of it is already helping to supply demands for feedstuffs, research shows that greater advantage might be taken of citrus waste for use in livestock rations.

USDA emphasizes the need to develop profitable uses for increasing volume of citrus wastes, especially to keep them from becoming a public health nuisance.

Expand "New Milk" Tests

Lima, Ohio, milk consumers should have most of the customer answers to the benefits and shortcomings of unfrozen concentrated milk (3-1) as soon as satisfactory surveys can be put together. Both Beatrice Foods and National Dairy are using the Ohio town as a testing ground for the new product.

National moved into Lima and Ashtabula after initial tests in Wilmington, Del. indicated an expanded test was warranted. National has also begun sales tests in Boston, the first large city to get distribution.

Not to be caught napping, Borden's also joined the parade, early in February with the marketing of their concentrated milk in eight southern Illinois cities.

If management-enthusiasm is an adequate substitute for definite evidence, this new form of packaged milk may be said to be well on its way to national adoption. But there are still a few bugs in the operation, not the least of which is the varying quality of local water for reconstitution.

Get More Angel Food

By adopting a continuous method of mixing angel-food cake batter and piping it directly to the depositor, a large midwestern bakery has accomplished four things: (1) Tripled its sales volume for the product, (2) cut down the scaling weight for its former 14½-oz. cake another ¾ oz., (3) increased the volume of its angel food

Fishery develops at-sea method to clean and sort oysters

● This prominent fishery installed a Cyclone Chain Drive Belt to handle cleaning and sorting operations right on the boat. All debris is dumped back into the sea, leaving more space available for storing oysters and eliminating waste cartage charges.

Cyclone makes three types of conveyor belts —Chain Link, Flat Wire and Flex-Grid—each designed to handle specific problems. Experienced engineers will select the one best suited to *your* production system. Get in touch with our nearest sales office, and write for free Catalog 84.

CYCLONE FENCE DIVISION
(American Steel & Wire Company)
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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS
CYCLONE
METAL CONVEYOR BELTS
UNITED STATES STEEL

"THE FRICK UNIT AIR CONDITIONER SAVED OUR CANDIES"

Says Hupper's Confectionery at Lancaster, Penna.

Here a 5-hp. Frick unit cools a room measuring 53 by 23 feet, protecting a large display of chocolates, and keeping customers comfortable. Installation by Marr Engineering Co., Frick Distributors at Reading, Penna.

There's a Frick air conditioning system to suit the exact needs of your business. Write now for literature and estimate.

DEPENDABLE REFRIGERATION SINCE 1882
FRICK CO.
WAYNESBORO, PENNA. U.S.A.
Also Builders of Power Farming and Sawmill Machinery

a new SMALL HOIST
with
a BIG FUTURE for you

SHEPARD NILES
LIFT-ABOUT-JR.

Designed to handle loads of 500, 1000, or 2000 lbs., the Shepard Niles Lift-About Jr. electric hoist actually exceeds, in performance, that which customarily is expected from these lighter service hoists. And requires less maintenance in doing so.

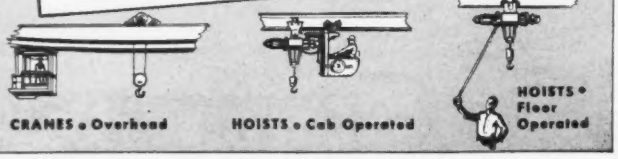
Two factors are responsible for such outstanding performance: one is a sound engineering background that comes from years of specialized experience. This is apparent in the design and construction of the hoist itself. The other is the Shepard Niles policy of making certain that the hoist you buy is the *right* hoist for *your* service. It is a policy that protects against buying a hoist that is too light for severe service. By the same token, it prevents investing more than necessary when lighter service *is* indicated.

If you would like help with your handling problems, write us. A Shepard Niles specialist will be glad to place our years' of material handling experience at your service.

Shepard Niles

CRANE & HOIST CORPORATION

Makes and sells all three lifting tools for airborne shop loads



CRANES • Overhead

HOISTS • Cab Operated

HOISTS • Floor Operated

422 SCHUYLER AVENUE • MONTOUR FALLS, N. Y.

Open for Business

Thomas J. Lipton, Inc. opened its new tea processing plant at Galveston, Tex., early in March. President Robert B. Smallwood is shown here using a gold key to officially open the main door.

20 percent more than with its former vertical-batch mixing technic, and (4) saved one-third of its labor cost.

In operation ingredients are sealed into a 340-qt. Glenn vertical mixer, where they are premixed for 2 min. Next, the premixed batter is delivered by sanitary pump into a 125-gal. stainless steel holding tank that feeds the premix batter continuously into a modified AMF Oakes mixer with a tapered nozzle at the discharge end. Finally, the completely mixed batter of an unbelievably low 0.25 specific gravity, is piped directly to the depositor at a rate of 1,000 lb. per hr.

Develop Icing Supplement

A new bacteriostat, developed to supplement icing of fish and other fresh foods has resulted from eight years experimentation at the Washington Laboratories, Seattle. Named "Fran-Kem," the product is a powder composed of equal parts of fumaric acid and sodium benzoate. Its producers express high hopes for its usefulness, particularly on fishing vessels.

Some Kansas Wheat Diseased

Although it does not mean that the Kansas wheat crop will be damaged extensively this year, many wheat plants collected from 26 western Kansas counties last fall now have mosaic disease.

That is the word of Prof. L. E. Melchers, head of the botany and plant pathology department, who has been supervising study of the living wheat plants brought to Kansas State col-

(*Continued on page 223*)

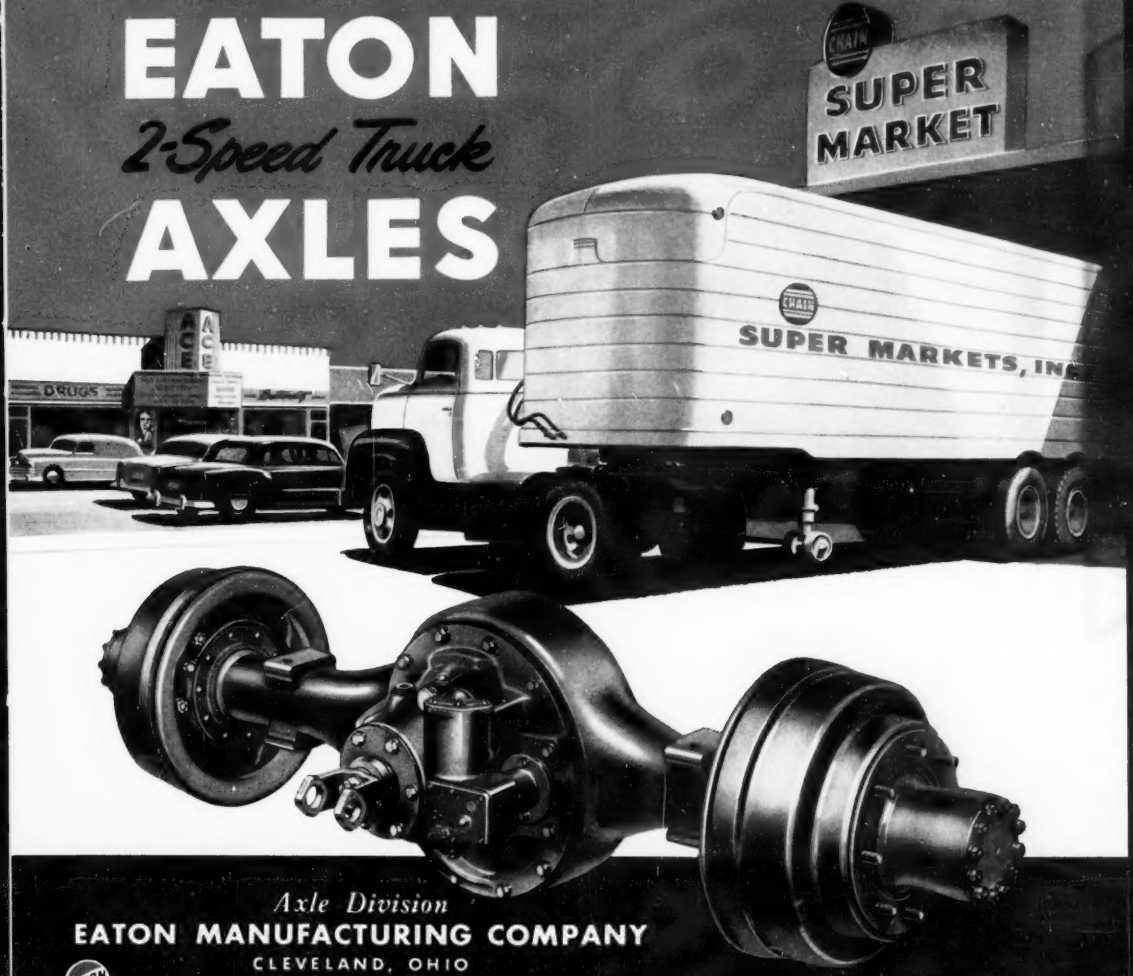
Speed Trucks in "Stop and Go" Traffic

The steady increase in traffic volume is of growing concern to truck operators. Unless trucks can keep pace with the flow of cars, schedules are slowed down and operating costs rise expensively.

Eaton 2-Speed Axles help truck owners solve this problem. Their vehicles have twice the conventional number of gear ratios. That means they can use a "low" gear for quick pick-up under full load. It means easier maneuvering in tight spots. It means climbing most hills faster. It means highballing on the open road. These advantages also result in operating economies—fewer stops for gas and oil—less time in the shop, because engines and all power transmitting parts last longer.

Your dealer will be happy to explain the value of Eaton 2-Speed Axles and tell you how Eaton's exclusive planetary gearing and positive lubrication assure long axle life.

EATON
2-Speed Truck
AXLES



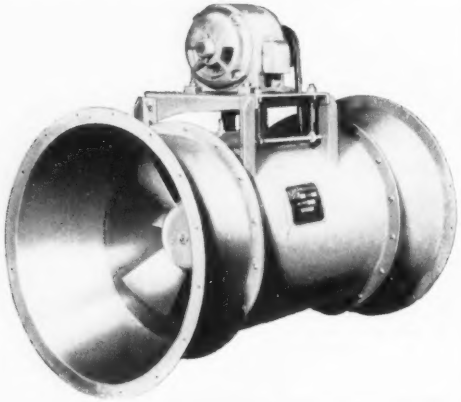
Axle Division

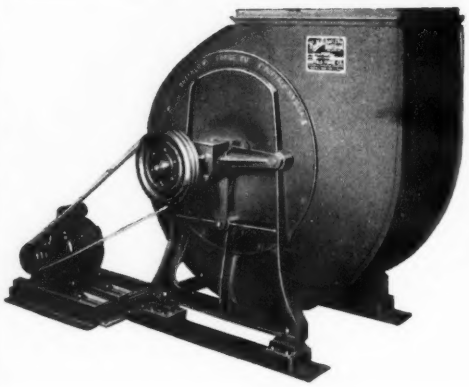
EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • JET ENGINE PARTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS SPRINGTITES • SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

2 DIFFERENT TYPES OF "Buffalo" FANS
—AND WHERE EACH GIVES BEST SERVICE





"Buffalo" AXIAL FLOW FANS

High efficiency on straight-line air delivery (no curved connections near inlet or outlet) . . . high velocity . . . moderate system pressure . . . are factors in choosing "Buffalo" Axial Flow Fans. Their compact design, too, makes them ideal where installation space is short. However, where system pressure is high, there is a sacrifice in efficiency, and a "Buffalo" centrifugal fan would be a better choice. Generally, "Buffalo" Axial Flows are lighter, more compact and cheaper to install than centrifugal fans.

"Buffalo" "LL" FANS

Here are the centrifugal fans used throughout industry for large-scale ventilation, exhaust and as air conditioning supply fans. They are designed to deliver against higher system pressures than Axial Flows, though both fans are non-overloading. "Buffalo" Type "LL" Fans retain their high efficiencies even when installed near curved duct connections. These fans may be had in direct or belted drive, almost any discharge position, and sizes up to 5,000,000 cfm.

Write For These Helpful Bulletins!

Bulletin 3533-C gives all construction data and a comparison performance characteristic curve of "Buffalo" Axials and "LL" Fans. WRITE TODAY!

Bulletin 3737, right, is the newest bulletin on the famous "LL" Fans, full of applicable facts on solving your ventilation problem.

BUFFALO FORGE COMPANY

152 MORTIMER ST. BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont. Branch offices in all Principal Cities

VENTILATING FORCED DRAFT | AIR WASHING COOLING | AIR TEMPERING HEATING | INDUCED DRAFT EXHAUSTING PRESSURE BLOWING

lege greenhouses last fall. "We are finding among these plants many that are infected." Melchers said, "but we can't tell how widespread wheat mosaic will be, whether it will be worse in one county or in one part of the state, or whether it will cause any appreciable loss. Time alone will tell."

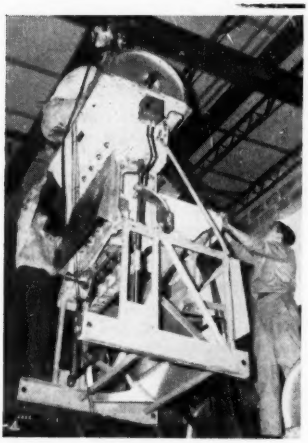
The plants have been grown in a K-State greenhouse for observation, juice extraction, and transmission tests to determine the virus causing the disease. But the disease so far has baffled those engaged in plant disease research.

Engineered for Efficiency

Engineered from the ground up, the Fosgate Citrus Cooperative plant, at Forrest City, Fla., went into operation late this season.

Designed by Food Machinery and Chemical Corp., the plant's center of operations is a new Carrier-Howard two-effect low-temperature, high-vacuum concentrator, which along with an auto-blender and two 500-gal. cold-wall blending tanks, will take 1,600 gal. per hr. of fresh, single-strength 12-deg. Brix juice and turn out 400 gal. of 42-Brix blended concentrate ready for can filling and freezing. This represents over 8,600 six-oz. cans per hr., or close to 25,000,000 cans per season.

The concentrate is frozen to a core temp of −5 deg. F. in a new immersion freezer, said to cut freezing time



More and Better Concentrates

Here is one of the new in-line juice extractors being installed at the Fosgate Concentrate Cooperative plant at Forrest City, Fla. Designed by Food Machinery and Chemical Corp., the plant incorporates the most advanced principles in both engineering and equipment.

DETECTO SCALES

There's a precision-accurate Detecto Scale for your specific weighing and counting need. The Detecto helps increase production, yet assures you maximum accuracy by making slightest weight discrepancies immediately visible.

DETECTO-GRAM NEW PACKING SCALE

Another Detecto-Gram Scale for weighing your ingredients accurately New Model #8800 brings to your heavy duty weighing jobs the mechanical accuracy previously found only in small scales. Capacity ¼ ounce to 60 lbs.

Write for Literature

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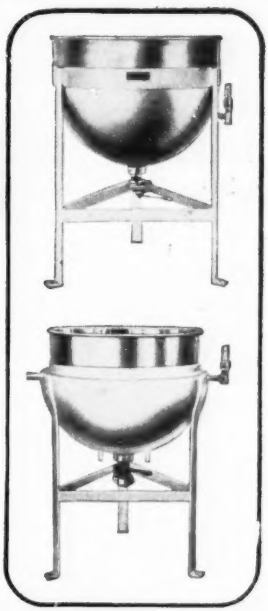
MAKERS OF FINE SCALES SINCE 1900
544 S PARK AVE. • BROOKLYN 5, N.Y.
SCALE ENGINEERS IN ALL PRINCIPAL CITIES

LEE
CORROSION-RESISTANT
KETTLES

Lee Kettles meet every processing need. They are practical, easy to clean and keep clean, meet all sanitary regulations and are available in sizes up to 500 gallon capacity.

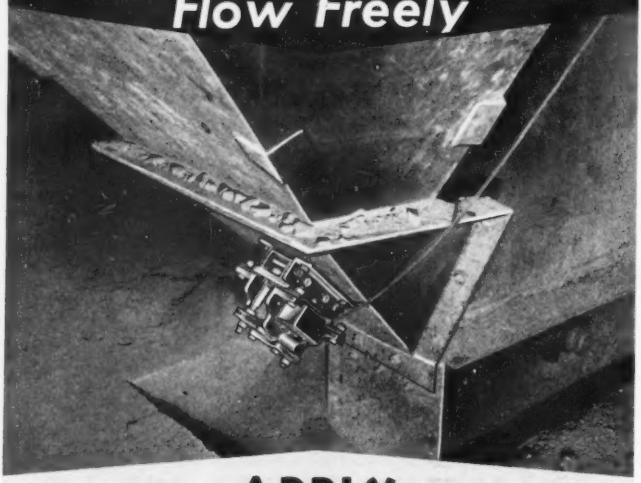
For longer service and greater all-around dependability, specify LEE *Corrosion-Resistant* Kettles.

Our descriptive technical bulletins sent on request.



LEE METAL PRODUCTS CO., INC.
416 PINE STREET, PHILIPSBURG, PA.
ALL LEE KETTLES ARE MADE TO A.S.M.E. CODE

Make Stubborn Bins, Hoppers and Chutes Flow Freely



APPLY

SYNTRON

"Pulsating Magnet"

ELECTRIC VIBRATORS

Banged-up and dented bins and hoppers cost money in replacement and in man hours lost—and that's where SYNTRON Vibrators come in. They eliminate the arching and plugging that takes a man's time to pound, and damage, those bins and hoppers.

What they are—pulsating electromagnets that produce 3,600 vibrations per minute from 110, 220 or 440-volt, 25, 50 or 60-cycle A. C. There are no cams, gears or eccentrics—merely electro-magnetic reciprocation from half-wave rectified current.

Where can they be applied—to any size and shape of bin, hopper and chute—whether made of steel, wood or concrete.

How are they applied—thickness or gauge of wall is the most important factor. However, over-all dimensions, cubic content, degree of fineness and moisture content of material must also be considered.

Write, giving the details of your troublesome bin or hopper—our Engineering Department will be glad to give you their recommendations.

SYNTRON COMPANY
460 Lexington Avenue Homer City. Penna.

to about one-fourth of that required in conventional dry freezing tunnels. Filled cans are fed automatically onto a revolving drum and pass through brine reduced to —30 deg. F. by a centrifugal refrigeration machine.

Temperatures in the concentrator are 75 deg. in the first effect and 50 deg. in the second. The vacuum maintained in the second effect is equal to about one-eighty-sixth of normal atmospheric pressure. Desuperheated steam is supplied to the first effect at 100 deg. F. by means of a jet nozzle device. Heat for the second effect is supplied by water vapor released from juice in first effect.

The entire frozen concentrate line is designed for continuous and automatic operation. Air conditioning is provided in processing room and laboratory.

Make "Roquefort" Down South

Blue mold cheese will be developed in earnest now that Clemson College has taken over sole ownership of the Stumphouse Mountain tunnel, in South Carolina. Experiments before World War II showed the temperature of the tunnel to be practically that of the tunnels of France where Roquefort cheese is made.

Clemson gained part ownership of the tunnel from the Blue Ridge Mountain Railroad and recently bought the remainder from a private estate. Started as a rail tunnel back in Civil War days it was never completed.

The college plans further experiments and developments under the direction of Prof. J. P. McMaster, head of dairying department.

Wanted: 60 Million Rations

Army quartermaster will buy 60,000,000 rations during the six months from May to October. Averaging about 10,000,000 individual and small detachment rations a month, these estimated purchases are in addition to what is currently under contract. They include 38,000,000 individual Combat "C" rations, 10,000,000 individual assault 1-A food packets, and 12,000,000 small detachment 5-in-1 rations.

Information on specifications and quantitative requirements for components, packing and packaging may be had from the Commanding General, Chicago Quartermaster Depot, 1819 W. Pershing Rd., Chicago 9, Ill.

Pack Tuna Through Winter

For the first time in the history of tuna packing in the Pacific Northwest, operations have continued throughout the winter at three Astoria, Ore., can-

Mobile Irrigator

Devised to irrigate large tracts, this Hawaiian Pineapple Co. watering machine mounts 800 ft. of 4 in. hose. One end of hose is attached to field pipeline sending 500 to 800 gal. a minute through hose and nozzles of two 50 ft. booms extending on either side of truck. Unit waters 12 acres in 8 hours, equal to about 1½ in. rainfall.

neries. Temporary shutdowns were necessitated early in March, but with the arrival of new shipments, operations were resumed. Imports of frozen tuna from Japanese and Central American waters made possible the extended operations.

Status of Standards

Status of food standards of Food and Drug Administration in early March is reviewed below:

POLICY STATEMENT

Status of *salt substitutes* under the Federal Food, Drug and Cosmetic Act has been clarified by a policy statement dated February 14, appearing on page 1725 of the February 21 Federal Register.

"The Federal Security Agency therefore no longer regards all salt substitutes as new drugs. Upon request, the Agency will express its opinion as to whether a new-drug application is necessary for any particular product if complete information concerning its composition and proposed labeling is submitted."

FUTURE HEARINGS

1. *Margarine*, amendments, standard of identity. March 27, as announced on p. 1640, February 16 *Federal Register*, permit use of additives for flavor stability, raise Vitamin A minimum content, and specify method of Vitamin

NO Creep · NO Weave · NO Jump

LA PORTE
FLEXIBLE STEEL
CONVEYOR BELTING

Insures Faster, More Efficient Food Processing

Perfectly flat, shape-retaining and highly resistant to corrosion, heat and cold, rugged LaPorte Conveyor Belting provides many trouble-free years of economical service. It is equally adaptable to freezing, canning, dehydrating, on sorting tables, in washers or cookers and every other food manufacturing process . . . and it greatly reduces time consumed from bin to shipper. LaPorte Belting is easily cleaned with steam or scalding water.

Order LaPorte Conveyor Belting from Your Supplier TODAY—Available in any Length, Almost any Width

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• SPRAYING • WASHING • RINSING • COOLING • AIR CONDITIONING

Get the most out of your Spraying Equipment with minimum power . . . with efficient spraying.

Use Yarway Nozzles. No internal vanes or other restrictions to clog or hinder flow. Two types—Yarway Involute-type producing a fine hollow spray with minimum energy loss, and Yarway Fan-type producing a flat fan-shaped spray with time-saving slicing action for cleaning.

Wide range of standard sizes and capacities. Cast or machined from solid bar stock.

Thousands in use. Write for Bulletin N-616.

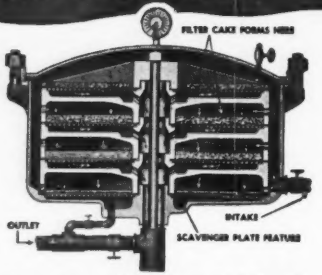
YARWAY SPRAY NOZZLES

YARNALL-WARING COMPANY
127 Mermaid Avenue, Philadelphia 18, Pa.

FOR HIGH SPEED, UNIFORM FILTRATION REQUIRED IN FOOD PROCESSING

SPARKLER horizontal plate FILTERS

Capacities 50 G.P.H. to 5000 G.P.H.



HERE ARE A FEW FOOD PRODUCTS THAT SPARKLER FILTERS HANDLE WITH EASE:

Candy Syrup
Chicken Broth
Cider
Egg Albumen
Extracts
Flavors
Honey
Gums
Liquors
Milk
Molasses
Vegetable Oil
Syrups
Vinegars
Wines
Fruit Juices
Alcohols
Alkalies
Beverages

Sparkler Filters operate on a distinctive principle, using horizontal plates, that are particularly efficient in maintaining uniformity in operation over a wide range of pressure, temperature, or viscosity conditions.

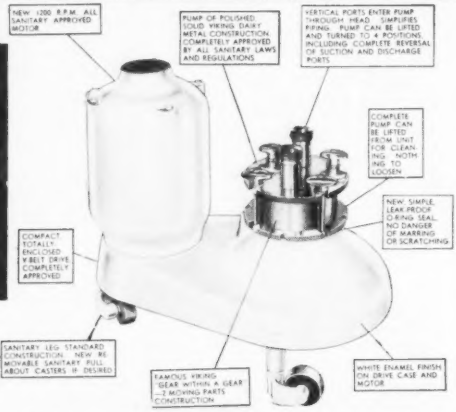
Filters water sparkling clear, removes all off-tastes, odors, color, sediment, chlorine, sulphur, algae, pipe rust, etc.

Because filter media are supported on a horizontal plane and filter aids floated into position uniformly, filtration takes place uniformly over entire filtering areas. Flow through filter is always with gravity. The patented scavenger plate filters the last drop, leaving no hold over in batch filtration.

We invite correspondence on your problems. You will receive the advice of filtration engineers with over a quarter of a century experience in a specific field.

SPARKLER MANUFACTURING COMPANY
MUNDELEIN, ILLINOIS

Field-Proved Features of the VIKING "Sanitor" PUMP


NEW 1200 R.P.M. ALL SANITARY APPROVED MOTOR
PUMP OF POLISHED SOLID VIKING DAIRY METAL CONSTRUCTION COMPLETELY APPROVED BY ALL SANITARY LAWS AND REGULATIONS
VERTICAL PORTS ENTER PUMP THROUGH HEAD. SIMPLIFIES PIPING. PUMP CAN BE LIFTED AND TURNED TO 4 POSITIONS, INCLUDING COMPLETE REVERSAL OF SUCTION AND DISCHARGE PORTS
COMPLETE PUMP CAN BE LIFTED FROM UNIT FOR CLEANING. NOTHING TO LOOSEN
NEW, SIMPLE, LEAK-PROOF O-RING SEAL. NO DANGER OF MARRING OR SCRATCHING
COMPACT, TOTALLY ENCLOSED V-BELT DRIVE COMPLETELY APPROVED
SANITARY LEG STANDARD CONSTRUCTION. NEW, REMOVABLE SANITARY FOOT. CASTERS IF DESIRED
FAMOUS VIKING GEAR WITHIN A GEAR — 2 MOVING PARTS CONSTRUCTION
WHITE ENAMEL FINISH ON DRIVE CASE AND MOTOR

Be sure your next sanitary pump has the field-proved features of the Viking "Sanitor". For over two years they have met the test, and with a pumping principle that has proved itself for over 40 years. The most copied of all rotary pump principles.

Ask for free bulletins D100E and E100E today.

VIKING AN HONORED NAME IN PUMPING

Be Our Guest In Sweets

Viking PUMP COMPANY
Cedar Falls, Iowa

A analysis. Proposed new optional ingredient is "a suspension in water of finely comminuted dehulled soybeans."

HEARINGS IN PROGRESS

1. *Ice cream,* new standard of identity. The hearing resumed as scheduled on February 14 to discuss dairy ingredients in ice cream and related products.

TENTATIVE ORDERS AWAITED

1. *Residue tolerances,* on fresh fruits and vegetables; new. Expected in early summer; hearing adjourned in September 1950, briefs were filed until December.

2. *Fruit preserves, jellies, and butters,* amendments, standards of identity. Not expected soon; briefs were filed until March 6, by extension from original closing date.

3. *Evaporated Milk,* amendments, standard of identity. Expected soon, hearing on March 5 required less than half of one day. No objections were raised to the proposed amendments. Briefs due by March 19.

FINAL ORDERS AWAITED

1. *Canned corn,* amendment, standards of identity, quality, and fill. Expected soon; tentative order published in April 1950, exceptions filed in May.

2. *Bread,* new, standard of identity. Expected soon; effort being made to issue final order as soon as possible; tentative order published August 1950, exceptions filed in November.

3. *Frozen fruits,* new, standards of identity and fill. Expected soon; tentative order published in October 1950, exceptions filed in January.

4. *Canned mushrooms,* amendment, standards of identity and fill. Not expected soon: final order published on page 1797, February 24 Federal Register. Exceptions could be filed until March 26.

STANDARDS COMPLETED

Cream cheese with other foods; pasteurized Neufchatel cheese spread with other foods, new. Standards of identity published on page 1632, February 16 Federal Register, effective August 16, 1951.

Action on USDA Grades

Recent actions by Production and Marketing Administration of U. S. Department of Agriculture on U. S. Grade Standards and related activities include the following:

Canned sweet potatoes, third revision, proposed, page 1285, February 10 Federal Register, written comments received until March 12.

Orange marmalade, new, proposed, page 1550, February 14 Federal Register, written comments received until March 16.

Canned cranberry sauce, new, page 1575, February 15 Federal Register, effective March 17.

Broccoli for processing, new, proposed, page 1595, February 15 Federal Register, written comments received until March 17.

Canned blueberries, revised, page 1663, February 17 Federal Register, effective March 19.

Frozen blueberries, revised, page 1666, February 17 Federal Register, effective March 19.

Lamb carcasses, yearling mutton, mutton, slaughter lambs, slaughter yearlings and sheep, revised, proposed, page 1736, February 21 Federal Register, written comments received until March 23.

Schedule of Events

April

9–11—National Fisheries Institute, 6th annual convention; Hotel Statler, Boston.

16–18—National Independent Meat Packers Assn., annual meeting; Palmer House, Chicago.

16–18—American Dry Milk Institute, annual meeting; Edgewater Beach Hotel, Chicago.

17–20—American Management Assn., 20th annual packaging exposition; Auditorium, Atlantic City, N. J.

22–26—American Society of Brewing Chemists, annual convention; Edgewater Beach Hotel, Chicago.

26–27—Pennsylvania Manufacturing Confectioners' Assn., 5th annual production conference; Lehigh University, Bethlehem, Pa.

30–May 4—American Material Handling Society and Material Handling Institute, conference and 4th annual exposition; International Amphitheatre, Chicago.

May

1– 3—American Oil Chemists Society, spring meeting; Roosevelt Hotel, New Orleans.

7–10—U. S. Brewers Foundation, annual meeting; Chase and Park Plaza Hotels, St. Louis, Mo.

14–16—Millers National Federation, annual meeting; Edgewater Beach Hotel, Chicago.

14–18—Assn. of Operative Millers, annual meeting; Sherman Hotel, Chicago.

21–25—American Assn. of Cereal Chemists, annual meeting; Nicollet Hotel, Minneapolis.

21–25—Assn. of Food & Drug Officials, annual meeting; Adelphi Hotel, Philadelphia.

June

3– 7—National Confectioners' Assn., 68th convention and 25th candy industries exposition; Stevens Hotel, Chicago.

17–21—Institute of Food Technologists, 11th annual meeting; Statler Hotel, New York City.

—*End*

LET US SOLVE YOUR HEAT SEALING PROBLEMS

Doughboy Model DB—Conveyor (shown with Model 495F Sealer). Applicable to a wide range of packaging operations. Belt mechanism can be tilted from 0 to 45 degrees. Belt mechanism can be raised from a low of 28" to 35".

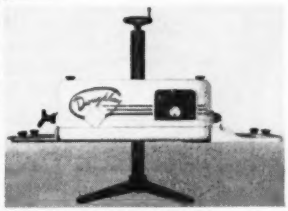
CONTINUOUS BAND SEALER

This Doughboy Sealer is the continuous band type for sealing polyethylene, pliofilm, vinyls and saran. It may be readily adapted to bag making by installation of bag making attachment.

Write for free literature and specific information on your sealing problems

Our engineers will be glad to conduct tests for you to help solve your sealing problems. Send us samples of your bags and products. Doughboy Sealing Machines are made to handle practically every type of material . . . cellophane, glassine, pliofilm, wax bags, various foil envelopes, polyethelene, etc. Doughboy seals meet specifications set up by the government for moisture barrier type sealing.

Doughboy Rotary Heat Sealers can handle such operations as imprinting code number or date in sealed area; hole punch seal for hanging bags on display racks, as well as the conventional, airtight compression seal.



SEE OUR DISPLAY AT THE PACKAGING SHOW, BOOTH No. 132, ATLANTIC CITY

Doughboy INDUSTRIES, INC.
NEW RICHMOND • WISCONSIN

• IN FOOD PROCESSING

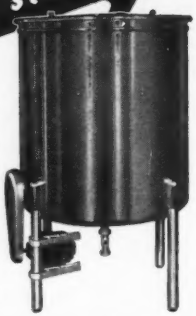
When You Use Low Temperature

USE CORK

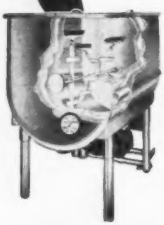
The time to make sure of your insulation protection is before you build or expand. Get the facts on Cork insulation when they can do the most good. Cork is so efficient in insulating properties that its performance has long been the accepted standard for low temperature requirements. Its wide usage in the refrigeration industry is due to its proved record for more than 40 years. Mundet refrigeration engineers are experienced in all details of temperature control. Write to us now for recommendations and estimates . . . let us help you secure the most profitable use of low temperature. Mundet Cork Corporation, Insulation Division, 7101 Tonnelle Ave., North Bergen, N. J.

MUNDET
CORK INSULATION

There's a STAINLESS STEEL SAN-I-TANK for every kind of food processing and storage



◊ For example, Type "J" is a single shell tank, available in capacities from 60 to 1000 gallons, that will take standard fittings of all kinds, is especially adapted for storage or mixing purposes.



◊ Type "CHR" is a jacketed tank for heavy or light processing, for cooking or cooling, and equipped with the famous horizontal "wiping action" agitator.

Write today for Bulletin SS-50, which describes Type "J" and other single shell tanks in detail. Write for Bulletins CHR-50 and JS-50 for detailed information about jacketed tanks.

STAINLESS STEEL SAN-I-TANKS

METAL GLASS PRODUCTS COMPANY

BELDING 6, MICHIGAN

UNITED STATES COLD STORAGE

Guardians OF THE NATION'S FOODS

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PORT LAVACA
TEXAS, P. O. Box 176

UNITED STATES COLD STORAGE CORP.

5 MODERN FORTRESSES FOR GUARDING THE NATION'S FOODS

Palletizing

Continued from page 210

The following picture is believed to speak for itself:

Thirty pallet truck bodies	$15,000
Two fork-lift trucks Two battery chargers	15,000
One extra battery 1,500 pallets (built to specification)	6,750
Changes in bottle and case conveyor	5,000
Two automatic case packers	10,000
Installation (electric, plumbing etc.)	4,000
Total	$55,750

Elimination of both loading and unloading crews, with their salaries totaling approximately $53,000 per year, practically offset the initial expenditure. And doing away with the warehouse crew, whose salary ran close to $7,000 annually, was an added saving. Therefore, it can be seen that an effected saving of almost $5,000 was realized the first year. Bear in mind that no other costs are considered.

Hidden behind the above figures are savings of money which, under manual operation, was always expended to reduce these costs, yet never materially succeeded. The hidden factors are: Elimination of broken bottles in handling of both empty and full cases; remedying of the excessive abuse that reduced life of the cases; and the tremendous reduction of spoilage of merchandise entailed in the former breakage of bottles, especially finished cases. Very apparent, but not considered in the above figure, is the big increase of storage area.

We'd say these savings indicate without question that the pallet system can bring real economies.

End *(Resume reading on page 102)*

Instruments Take Hold

—Continued from page 97

rely on circulation of a refrigerant through its heat-exchange system. Slight variations in wort flow, or in the quality or quantity of coolant, can result in a critical deviation from the optimum pitching temperature.

The engineering department of one major brewery has solved this problem by locating a sensitive electric resistance bulb, set in a thin-wall stainless steel well, directly in the wort stream coming off its Baudelot cooler. A narrow range electronic instrument (0-10 deg. R.) is teamed with this bulb to control brine circulation in the lower tubes of the cooler to maintain wort temperature. Continuous control to within ¼ deg. R. has been found possible.

Electronic measurement has another virtue that is useful to the brewer. This is its ability to allow great distance between point of measurement

and the recording instrument. Connections between locations merely involve lengths of electric wire. Further, this electric interconnection allows a single instrument to gather readings from many different locations (as many as 16) on one recording chart.

Brewers thus have a convenient means for graphic tabulation of their processes. For example, in one brewery a single electronic chart registers time and temperature curves from the following widely scattered locations: Brine line attemperators, inlet to carbonating cooler, beer cooler, bottle pasteurizer, cellar storage, brewkettle, hot wort cooler, outlet carbonation, outside temperature, fermenting cellar, can pasteurizer, hot water tank, sparge water, hop room, and storage cellar.

This simple instrument technic saves a great deal of shoeleather and even more pencilled notations.

Check on Pasteurizer Efficiency

An unusual application for electronic equipment has also appeared in the bottling house. To get away from sending water-tight temperature recorders through the pasteurizer to check its efficiency, thermocouples are located in bottles and allowed to make this travel.

These electrical temperature pick-ups are connected to a length of lead-wire suspended from a track running the length of the pasteurizer. As the bottle moves along, pulleys holding the leadwire pay out along the track. The leads go back to a panel-mounted electronic instrument that draws a very accurate continuous record of the pasteurizing cycle.

We have seen how program control and electronics are setting the stage for automatic brewing. However, even more subtle instrument technics as now being used to solve challenging problems.

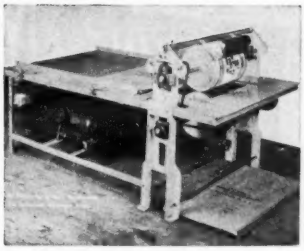
One brewer, for example, has installed an automatic control system which will proportion one beer to another to produce a uniform blend continuously. Here, instruments measure flow rates of the two beers and regulate the lesser flow so that it is added in proportionate fashion to the uncontrolled main stream.

While currently rare in brewing, this somewhat sophisticated control system described for beer blending has widespread use in involved chemical and petroleum processes. Perhaps this is indicative of things to come in one of the world's oldest food processes.

This article is based on a paper presented by the author at the 63rd. Annual Meeting of the Master Brewers Association of America in Philadelphia, Pa.

End (Resume reading on page 98)

Print your own Corrugated Cases or Multi-Wall Bags



as you need them—with this economical

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Now you can reduce inventory costs and storage problems on pre-printed bags—by printing bags as needed with this rapid, simple automatic motorized machine. Faster, cheaper, better than hand stenciling. No more poor marking. Hours gained; trouble eliminated. Send data on sizes of bags, printed area, sides, or samples, for our quotations.

A FEW FEATURES

- Can imprint 2400 bags an hour.
- Resilient interchangeable rubber type.
- Self-inking reservoir.
- No "make-ready" needed.
- Adjustable for various sizes.
- Spring-loaded pressure roller takes various thicknesses.
- Units available to imprint loaded and flat corrugated boxes (example: Borden Powdered Milk).
- Users: Carbide & Carbon Chemical, Liggett & Myers, American Tobacco, General Mills, A. E. Staley.
- Price (approximate) $2,000 F.O.B.

THE *Industrial* MARKING EQUIPMENT COMPANY INC.
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IME

Designers and Builders of MARKING EQUIPMENT FOR INDUSTRY
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Send us a sample OF ANY STOCK YOU WANT TO PULVERIZE

We'll make a test grind with

SCHUTZ-O'NEILL PULVERIZER

You will receive our Engineering Report suggesting the best method to use and the type of Schutz-O'Neill Pulverizer and any receiving or sifting equipment suited to your requirements.

SCHUTZ-O'NEILL offers you the benefit of more than a half century of experience in rapid, accurate, dustless pulverizing of any dry, grindable, non-gritty stock.

SCHUTZ-O'NEILL Pulverizers are made in 6 sizes with capacities up to 2000 lbs. per hr. Also Gyrator Sifters, Roller Mills, Receiver Boxes, Collectors, Hammermills, etc.

When sending sample, be sure to State fineness desired.

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309 PORTLAND AVE.
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OMEGA

THE LAST WORD IN FEEDERS . . .

— for dry materials . . . sugar, cocoa, flour, beatrine, powdered eggs, magnesium carbonate, leavening mixes, vitamin concentrates — and liquids . . . oils, extracts, coloring, and syrups.

For Bulletins and complete information, address Omega Machine Company (Division of Builders Iron Foundry) 402 Harris Ave., Providence 1, R. I.

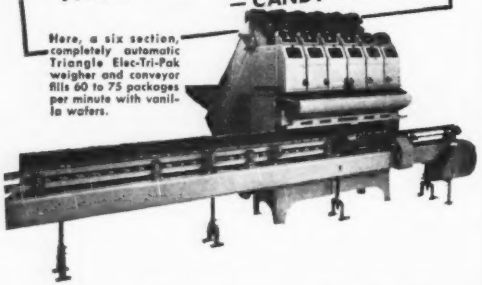
OMEGA MACHINE COMPANY

SAVING $11,520 PER YEAR
in packaging costs while increasing production 54%.
—NOODLE MANUFACTURER

SAVING $200 A WEEK
—COOKIE PLANT

$3,500 PER YEAR
added to profit.
—CRANBERRY PACKER

40 HOUR DAILY LABOR SAVING
Production increased 7,200 daily.
—CANDY PACKER



Here, a six section, completely automatic Triangle Elec-Tri-Pak weigher and conveyor fills 60 to 75 packages per minute with vanilla wafers.

THESE ARE typical examples of the savings effected in 31 midwest plants by replacing obsolete machinery or hand packaging methods with modern Triangle machines. Why lose out on savings like these? Triangle semi or fully automatic weighers, fillers, carton sealers, powder packers are available to package any dry product into any style container by weight or by volume. For recommendations, send a sample-filled package and state production requirements. No obligation.

Send for the Facts and Figures Bulletin

TRIANGLE PACKAGE MACHINERY CO.
6655 W. DIVERSEY AVENUE, CHICAGO 35

Sales Offices: San Francisco, Denver, Dallas, Atlanta, New York, Pittsburgh, Baltimore, Jacksonville, *Branch Factory:* Los Angeles.

Men & Companies

Industry

Adolphus Rice Mills, Inc., Houston, Tex., has purchased Walton Rice Mill, Inc., Stuttgart, Ark., for $2,000,000.

Beaumont Canning Co. has announced plans to erect a $30,000 cannery at Richmond, Va.

Chemical Division of The Borden Co. has named Barton B. Wadsworth and Dr. Edward L. Kropa as divisional vice-presidents.

Central California Berry Growers Assn. will freeze and distribute berries supplied by member growers. Al Smith, formerly of Santa Clara Frosted Foods, has been made production manager.

Continental Baking Co. will lease a Sacramento, Calif., plant, now building, where equipment for the production of Wonder bread will be installed.

Crosse & Blackwell Co. has appointed Warren H. Delventhal sales manager of the frozen foods division with headquarters in New York City.

Dothan Oil Mill Co. is going to erect a $500,000 peanut oil extraction plant at Dothan, Ala., to replace present facilities. Change will include a switch from the hydraulic pressure method of extraction to expeller and solvent systems.

General Foods has announced transfer of David W. Thurston, formerly in the advertising department of the Minute Division, to the post of assistant product manager, Jello Division.

James J. Winston, chemical consultant and sanitation adviser, is the newly named director of research, National Macaroni Manufacturers Assn.

Kenneth E. Duggan of Western Branch labs, joins Birds Eye-Snider. Previously he was with Food Technology Department, Oregon State College.

Hawaiian Pineapple Co. has sold its Dolmex cannery at Estacion Tuxtilla, Vera Cruz, Mexico, to Sociedad Mexicana de Credito Industrial S. A. Company has also discontinued planting experiments in Cuba, started in 1947.

Johnson Candy Co., formerly of Atlanta, is starting production at its new Greenville, S. C., location.

Laurence Milling Co., St. Louis, has been purchased by Lauhoff Grain Co. of Danville, Ill. Manufacture of corn flour and corn meal will be continued.

Lee Foods Division of Consolidated Grocers Corp. has started construction of a large modern warehouse at Kansas City, Mo.

Libby, McNeill & Libby will reopen its Yakutat, Alaska, salmon cannery, which has not operated since 1948.

Maxwell House tea operations, now located in Brooklyn, N. Y., will be moved next fall to Hoboken, N. J., where they will occupy part of a new addition to the company's plant, now under construction.

Montreal Vinegar Co., Montreal, Que., has constructed a $100,000 addition to its plant with an overall 21,000-sq. ft. increase in operating area.

Pacific Fruit Express Co. has

HOLD pH VALUE AUTOMATICALLY

Hundreds of food plants use Bristol Automatic pH Controllers and Recorders to hold pH at the value known to produce the best results.

In many processes pH has a marked effect on the product. When automatically controlled, time, money and materials are saved, and a more uniform quality product results.

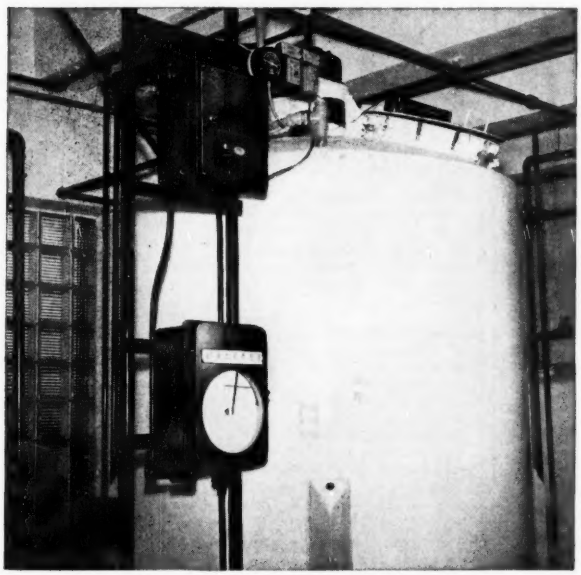
In plant water treatment, for example, the control of pH at very definite values is almost an absolute necessity for proper operation of coagulation, neutralization, softening, and ion exchange processes.

In sugar refining, automatic regulation of liming of raw cane juice maintains pH at the value that produces proper clarification.

In manufacturing gelatine, pH must be carefully controlled to obtain a product with the desired solubility, viscosity, clarity, and jelly strength.

Control of pH is also an important factor in efficient neutralization of excess acidity or alkalinity of waste before disposal.

Write for bulletins covering pH instruments and the other Bristol Food Plant Instruments listed to the right. THE BRISTOL COMPANY, 115 Bristol Road, Waterbury 20, Conn.



Typical installation of Bristol pH Instruments

FROM COAST TO COAST MANUFACTURERS OF

Bakery Products
Beverages
Canned and Preserved Products
Cereals
Coffee
Confectionery
Corn, Potato, and Root Starch Products
Dairy and Milk Products
Edible Oils
Flavoring Extracts, Food Colors, etc.
Gelatine
Grain Products
Meat Packers
Sugar
Syrup and Molasses
Vinegar and Cider
Vitamins
Yeast

USE THESE BRISTOL INSTRUMENTS

Automatic Control Instruments — including electric, pneumatic, and time-program controllers,
Recording Instruments, and
Telemetering Instruments

TO MEASURE AND CONTROL

Absolute Pressure
Current
Draft
Flow of Fluids in Pipes
Humidity
Liquid and Water Level Recorders
Mechanical Operation and Motion
pH Value
Power
Pressure
Running and Down Time and Running Count
Speed of Travel and Rotation
Temperature (including thermometers, pyrometers, and potentiometers)
Time in Process
Vacuum
Voltage

FOR BETTER QUALITY AND LOWER COSTS IN

Air Conditioning
Baking
Blanching for Canning
Cooking and Boiling
Drying
Electric Equipment and Plant Distribution Systems
Evaporating, Condensing, Distilling
Fermenting
Flow of Liquids, Solutions, Steam, and Gases
Heat Exchanging
Heating, Cooling
Mixing, Kneading, Blending, Emulsifying, Homogenizing
Pasteurizing
Plant Waste Disposal
Product and Materials Handling
Refrigeration
Roasting
Steam Generation and Distribution
Sterilizing
Water Supply

BRISTOL

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

For Frozen Food Vehicles . . .

For LCL Shipping Containers . . .

LIGHT insulation is the RIGHT insulation!

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ULTRALITE

The long glass fiber insulation

Ultralite is "the Carriage Trade Insulation" —highly efficient, vibration-proof, and so light that it adds almost nothing to your travel load! This superb insulation of fine textile-type glass fibers is semi-rigid and resilient—won't shake down, settle or pack in the walls, floors and ceilings of your frozen food vehicles. Yet Ultralite is flexible enough for the very latest collapsible LCL shipping containers, as well as "throw away" and rigid containers. Ultralite will not support rodents or bacteria, won't pick up odors, won't burn or rot.

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Samples, prices, full details and BROCHURE "F"—a new brochure on vehicle insulation.

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GUSTIN-BACON MFG. CO.

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New York Chicago Philadelphia San Francisco Los Angeles Houston Tulsa Ft. Worth

Laurence L. Little, former technical director, is now manager Dairy & Special Products Division, E. F. Drew Co.

started work on a $1,000,000 artificial ice plant at its Laramie, Wyo., reefer car icing facilities on the Union Pacific line.

Ralston Purina Co. is constructing a $1,000,000 feed plant at Delmar, Del.

Rockingham Poultry Marketing Cooperative's new plant at Alma, Va., is now under construction. Estimated total cost is $185,000.

San Juan Islands Canning Co., of Mt. Vernon, Wash., has purchased the McMillan Cannery at LaConner, which it has been leasing since its own buildings were destroyed by fire last year.

Seaboard Packing Co. announces plans for erection of a large modern fish handling plant at Robinston, Me., to replace the structure previously used, which was destroyed by gale winds last fall.

Snow Crop Marketers Division of Clinton Foods, Inc., has named R. E. Vincent director of sales and Duncan Kelly national sales manager.

A. E. Staley Manufacturing Co. has announced appointment of Luther S. Roehm, formerly of Dow Chemical Co., as manager of the corn division. Paul R. Ray, formerly of Doughboy Industries, has been made manager of the soybean division.

Thomas Cannery has started operations at its new Tahlequah, Okla., plant after transferring from Fort Worth, Tex.

Twin City Co-Op Co., Morgan City, La., has purchased Frozen Sea Foods Co. of Port Isobel, Tex., for $110,000. Expected expansion of facilities will increase daily production of frozen shrimp to 48,000 lb.

Washington Farmers Assn., of Seattle, has started construction of a $250,000 office and plant building at Tacoma. The structure, expected to be completed next month, will include egg and poultry handling facilities.

Personnel

I. H. Bowen, Modesto, is the new president of California Canning Peach Assn.

E. D. Clark has been made branch manager of the Jacksonville, Fla., territory of H. J. Heinz Co. He succeeds C. J. Watts, now manager of the New England area.

Paul F. Clark, president and chairman, John Hancock Mutual Life Insurance Co.; C. L. Christensen, president, National Cylinder Gas Co.; and Robert E. Pearsall, executive vice-president, Armour and Company, have been elected directors of Armour and Company.

W. W. Clements has been made vice-president and general sales manager of the Dr. Pepper Co.

Hopkins C. Cushing, grain buyer for Commander-Larabee Milling Co., has been transferred to the company's Kansas City offices.

J. L. Dampier has been elected a vice-president of Lever Bros. Co. in charge of detergent and shortening sales.

Walter S. Driskill, sales manager of McCormick & Co., has been elected to the company's board of directors.

George E. Egger has been named president of the Morton Packing Co., Louisville, Ky., to succeed L. Owsley Haskins, retired.

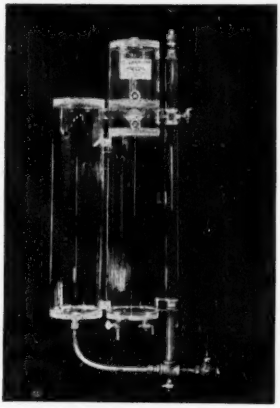
Maurice J. Erisman, formerly chief engineer, Los Angeles plant of Link-Belt Co., Chicago, has been made assistant engineer of the Chicago plant. He is succeeded at Los Angeles by Homer J. Foye, formerly chief engineer at the Seattle, Wash., plant.

J. A. Gettier has been appointed manager of Pillsbury Mills New York Grocery Products branch.

Joseph J. Glass, Chicago, has been appointed regional director of the newly created defense fisheries administration covering the Great Lakes area.

Chlorinate— THE SIMPLE WAY!

WITH CHLORAMETERS



Thanks to simple design and non-corrosive construction the CHLORAMETER eliminates headaches in treating

- Plant Water
- Cooler Water
- Process Water
- Any Dubious Water

The CHLORAMETER has only one moving part... is easy to install, simple to operate . . . uses one simple adjustment to insure ACCURATE PROPORTIONAL FEED at any practical dosage.

BENTON PRODUCTS, Inc.
(Dep't. J)
175 Orawaupum Street White Plains, N. Y.

Adhesives for PACKAGING

—in cans, glass or cartons . . . by hand or in any make of high-speed, automatic labeling or packaging machine...for small or large sizes; unusual shapes; coated, foil or regular stock . . . to Government or your own specifications!

Adhesives for – BOTTLE-LABELING • CAN-LABELING
LAP-LABELING • CASE-SEALING • LAGGING

With 65 years of pioneering in the making of adhesives, more than 10,000 formulas have been developed in our five laboratories. Today we serve the leaders in a hundred industries . . . We invite the opportunity to submit samples for you to test in your own plant—under your particular working conditions—for your specific requirements.

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Adhesives?... ARABOL!
65 YEARS OF PIONEERING

RAX

Containing Warfarin (WARF Compound 42)

IS UNFAIR TO RATS!

RAX does not discriminate! It kills them all. Here's a new Prentiss product that's a sure-cure for your pest-control problems. RAX is a tasteless and odorless rodenticide that is easily combined with any number of different baits. No chance of rats detecting its presence.

RAX, containing warfarin* (WARF Compound 42) kills by producing internal hemorrhage. It is a cumulative poison, so the chance of accidental poisoning of humans or pets is relatively minor. Results from all over the country indicate that RAX is 85-90% effective in killing rats and mice.

The Use of RAX Powder in structural pest control operation offers a potential opportunity to place rodent control on a satisfactory service basis—something not heretofore possible with available rodenticides.

PRENTISS DRUG & CHEMICAL CO., INC.
Formerly R. J. Prentiss & Co., Inc.
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9 So. Clinton St., Chicago 6, Ill.

* Distributed under U.S. Patent No. 2,427,578

For complete information and samples mail coupon TODAY!

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Formerly R. J. Prentiss & Co., Inc.
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I'm interested in your RAX Powder Pest Control Program. Please send full details.
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Company .....
Address .....
City ..... Zone ..... State .....

Better 3 WAYS

1 Rapistan Flexibility

Now a conveyor line can be fitted to your handling problem. Rapistan power and gravity units are adaptable to any floor plan—with rerouting as easy as moving furniture! New layouts can be made easily without expensive plant shutdowns.

2 Rapistan Quality

Performance is improved by such Rapistan features as exclusive "knitted frame" gravity conveyor design, for extra strength . . . grease packed ball-bearing conveyor wheels, lubricated for life!
One-piece power belt "box channel" bed construction, no welds!

3 Rapistan Value

Original cost of Rapistan equipment is low. Upkeep is kept at a minimum because bulk of flow system is low-cost gravity conveyor, with power units only at strategic points. Excessive handling is eliminated, storage space and man hour output greatly increased!

• *Write today for free general catalog and case histories! The Rapids-Standard Co., Inc., 494 Rapistan Bldg., Grand Rapids, Mich.*

Representatives in Principal Cities

Booths 154 & 155 Materials Handing Exposition

Rapistan® MATERIAL *flow* EQUIPMENT

CONVEYORS: *Power or Gravity, Portable and Stationary*
Also a complete line of CASTERS & HAND TRUCKS

Dr. Paul R. Glenister, formerly of the faculty of Wilson Junior College, Chicago, has joined the research staff of J. E. Seibel Sons Co., Chicago.

Fred D. Goodyear has succeeded Irving J. Bjork as vice-president in charge of the western region of The Best Foods, Inc.

George C. Grant of Atlanta, industrial relations director of American Bakeries Co., has been named a director.

H. Lyle Greene succeeds the late H. Kirke Becker as president of Peters Machinery Co., Chicago, manufacturer of automatic packaging and baking equipment.

W. E. Jones has been named plant manager of American Home Foods' Pacific region plant, San Jose, Calif.

Erik Lundstedt, formerly production manager of Sante Foods, Inc., Goshen, N. Y., is now associated with Sunny Brook Creamery, Miami, Fla.

Dr. Gordon MacKinney, professor of food technology, University of California, Berkeley, has been appointed to the advisory board of *Analytical Chemistry,* monthly publication of the American Chemical Society.

J. I. Moone has been elected executive vice-president in charge of operations and corporate sales of Snow Crop Division, Clinton Foods, Inc., New York; Joseph M. Waters, vice-president in charge of advertising and merchandising; Milton E. Stover, vice-president and controller; and Mark Candee, general counsel.

Harry M. Pancoast, formerly with American Home Foods, San Jose, has joined the staff of Topco Associates, Inc., San Francisco, where he will direct quality control.

Ernest A. Oliver has become general manager of Economic Machinery Division of the Geo. J. Meyer Manufacturing Co., succeeding Andrew J. B. Adams, retired.

Horace M. Putnam, Lyons, N. Y., was elected president of the National Red Cherry Institute at the annual meeting held in Chicago. Gary S. Morgan of Traverse City, Mich., is new vice-president.

Charles R. Rawden has been named secretary-treasurer of Stafford Foods Ltd. of Canada.

Joan M. Rock has been named director of Consumer Services, Amino Products Div., International Minerals & Chemical Corp.

William A. Roberts is new president of Allis-Chalmers, succeeding the late Walter Geist.

Emil M. Scher has been appointed manager of the midwestern division of the Armour Laboratories. He has been with the laboratories more than 30 yr.

Capt. William E. Simpson is now manager of General Seafoods Ltd., Halifax, N. S., succeeding the late Thomas R. Clouston.

Alfred H. Smith was made a vice-president of Armour and Company to head the poultry and dairy division. Mr. Smith, with over 30 yr. experience with the division, formerly served as general manager.

C. E. Spooner is new general manager of manufacturing and B. M. Draper general manager of the retail division of Canadian Food Products, Ltd., of Toronto.

George F. Thomas has been named president of Prater Pulverizing Co., Chicago, to succeed Ralph Prater, deceased. Mr. Thomas will continue his former duties as general manager.

Associated Industry

Admiral Tool & Die Co., Inc., has taken over the manufacture and sale of all Effenbach processing equipment.

Brooks Boiler Treatment Co., Cleveland, has announced a change in the company's name to Brooks Chemicals, Inc.

Dewey & Almy Chemical Co., Cambridge, Mass., has purchased property at Cedar Ra-

"Cuts pressing time 1/3 with help of CELITE"

A report on prune pressing by a Celite Field Engineer

"BEFORE USING CELITE* Pressing Aids, one of my customers was getting only two batches of prune juice per day from the presses. When he started mixing a small percentage of Celite with the cooked fruit, the saving in pressing time was apparent at once. Now he gets three batches per day.

"In addition, the juice is much clearer and cloth breakage is reduced to the point where this alone represents a big saving."

. . .

This user's experience is typical of that in many plants where Celite Pressing Aids are used. Faster production, clearer juice, higher yields, less wear and tear on cloths and equipment are some of the important benefits obtained when these diatomite powders are added in small amounts to the pulp before pressing.

HOW CELITE PRESSING AIDS WORK:

The tiny Celite particles, open and porous in structure, interpose themselves between the particles of solid pulp matter. This opens up countless minute channels through which the juice can escape, freely and at lower pressure. More juice is thus extracted in less time. The drier cake is more easily removed and the cloths can often be reused without washing.

Celite Pressing Aids are used with practically all types of fruit products. No special equipment is needed and the benefits they assure will usually more than pay for the small amounts of powder required.

If You Filter:

Celite Filter Aids can bring you corresponding benefits in faster production, sparklingly clear juices, longer filtration cycles. They are available in 9 grades of particle fineness, each designed for a specific filtering requirement. A Celite Engineer will be glad to give you all the facts.

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For further information, write Johns-Manville, Box 290, New York 16, N. Y.

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CLEANING ENGINEER

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● Check total costs at the end of one year—you'll find you pay much less for Holcomb materials than any other cleaning products.

Holcomb waxes do not chip, wash off or discolor—your floors need rewaxing less frequently. Holcomb brushes and cleaning equipment are expressly designed to cut cleaning time. And Holcomb soaps and cleaners go farther—much farther.

Call your nearby Holcomb Serviceman. He's a *cleaning engineer*—backed by the world's largest cleaning research laboratory. Let him make a complete cleaning survey, give you *scientific* cleaning recommendations.

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J. I. HOLCOMB
MANUFACTURING COMPANY

Scientific cleaning materials

pids, Ia., where immediate construction is planned for facilities to manufacture plastic bags used in the packaging of frozen and processed foods.

Hartford-Empire Co., Hartford, Conn., has changed its name to Emhart Mfg. Co. Divisions of the company include Standard-Knapp, Plax Corp., Henry & Wright, V & O Press Co., and Stonington Division.

Harbor Container Corp., Emeryville, Calif., has started production of corrugated shipping containers in its new plant.

Howe Scale Co. has named George A. Seaver manager of the New York City branch and William H. Leland manager of the Newark, N. J., branch.

Norka Beverage Co., Akron, has elected Jerome Paquin vice-president and treasurer.

Omega Machine Co., Providence, R. I., has appointed Andrew Melnychuk project engineer at the home office.

Pacific Can Co. began a $500,000 expansion of its San Leandro, Calif., plant in February. Output will be increased 40 percent with the addition of 40,000 sq. ft. of space and new equipment.

Sealright Co. has designated a new sales district covering New York state, western Pennsylvania, and West Virginia. Jack LeMessurier, manager of the district, will have headquarters at Syracuse, N. Y.

Foster D. Snell, Inc., New York, consulting chemists and engineers, have added to their staff William Kanninen, Irving Seidenberg and Dr. Haldane Gee.

Thomas Cornils was recently appointed chief engineer, Pacific Northwest Division, Link-Belt Co.

James L. Knipe, is the new general sales manager of Union Bag & Paper Corp.

Swartout Co. has named Kenneth P. Hengesbach sales director of its newly opened Detroit offices.

United Board & Carton Corp., Syracuse, has named Charles H. Maltby a director.

Victor Chemical Works has announced promotion of F. Carr Price to the post of chief engineer, with S. C. Crawford as assistant chief engineer.

Wirebound Box Manufacturers Assn., at its annual meeting in New Orleans, named A. L. Whiton of Chicago president to succeed Norris W. Embry, now vice president. K. H. Leash, Portland, Ore., and W. J. Pierpont, Savannah, Ga., were elected directors.

Deaths

Krikor Arakelian, 79, K. Arakelian Winery, California—Feb. 25.

John H. Bier, 50, general manager, American Home Foods, San Jose, Calif.—Jan. 4.

Otto Bremer, 84, chairman, Jacob Schmidt Brewing Co., St. Paul, Minn.—Feb. 18.

George H. Burnett, 67, Southboro, Mass., former president Flavoring Extract Manufacturers Assn.—Feb. 23.

Louis Caravetta, 70, president Caravetta Food Co., Chicago—Feb. 26.

Joseph Di Giorgio, retired president Di Giorgio Fruit Corp., San Francisco—Feb. 25.

Edmund P. Pillsbury, 37, vice-president, Pillsbury Mills, Inc., Minneapolis—Feb. 22.

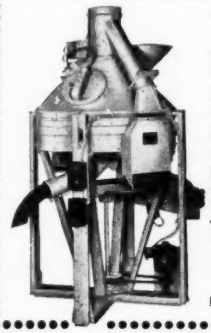
Dr. Ward B. White, 66, chief of the Food Division of Food & Drug Administration, Washington, D. C.—Feb. 24.

HERE'S THE ANSWER TO ORNERY CLEANING AND CLASSIFYING JOBS

If, for example, you are making edible corn products, you want to rid the kernels of ferrous objects, stones, cob fragments, and unmentionable foreign materials. If you are making puffed cereals, you want to remove the hard, tough grains, metal fragments, black germs, and chaff.

Whatever dry food materials or products you are processing, you can probably clean and classify them with the new Model Bauer No. 208-2 Specific Gravity Separators.

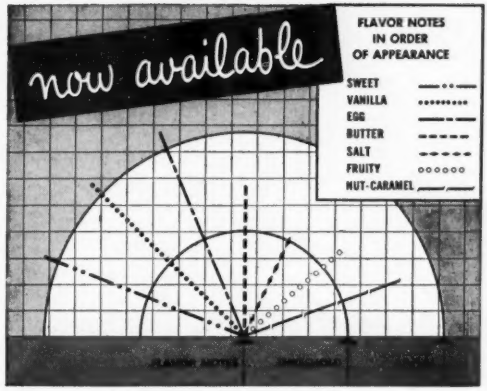
The model illustrated (No. 208-2AA) is used for cleaning shelled peanuts, shelled corn, coffee, and oil-bearing seeds. It's one of seven standard models—and we also build special models to meet special situations.



Our Bulletin F-16 gives detailed information on these machines and their installation. It also offers you our laboratory service to show what can be done with a test run of your particular materials.

Ask for a copy of the bulletin now while the subject is on your mind.

THE Bauer BROS. CO.
1740 SHERIDAN AVE.
SPRINGFIELD, OHIO
ESTABLISHED 1878



New ORGANOLEPTIC PROFILE Report on Vanilla Flavoring

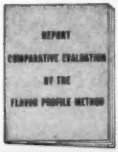
Latest scientific method for evaluating flavor results used to test pure vanilla, vanillin-coumarin solution, and Aromanilla.

Send for your copy of the complete report giving a step by step account of the tests conducted by Foster D. Snell, well known New York research organization. You'll see how skilled taste panels evaluate flavors according to:

1. characteristic notes of aroma and flavor
2. the order of appearance of those notes
3. their strength
4. the total flavor effect

You'll see how these notes are diagrammed so that the flavor results are shown in easy-to-grasp pictorial form.

This Study represents a serious and sincere effort on the part of The Aromanilla Company to help bring more scientific methods to bear on this one problem of ingredient selection that lies within its province. If you are interested, we will be glad to send a copy.



FREE copies of this Organoleptic Profile report on vanilla flavoring available to all in the Food Industry interested in more scientific methods of ingredient evaluation.

Aromanilla
IMITATION VANILLA FLAVOR
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Solid Food Products Packed in Container Consisting of Thin Ice Walls Having Smooth Inner Surfaces and Subjected to Quick Freezing Temperatures Appropriate to Food Used—*T. S. Gorton, Jr., Chicago, Ill. No. 2,522,221. Sept. 12, 1950.*

Fruits and Vegetables Dehydrated to 3 Percent Moisture Content in Sealed Vessel With Final Drying Under Vacuum of 28.5 in. Hg With Controlled Heat Preliminary to Breaking Vacuum and Creating one Atmosphere Pressure in Sealed Vessel to Collapse Dehydrated Particles—*E. K. Ketcham, Yakima, C. F. May, Selah, and E. E. Jagow, Yakima, Wash., to Vacu-Dry Co., Oakland, Calif. No. 2,522,276. Sept. 12, 1950.*

Legume Seeds Soaked at 50 to 120 Deg. F. in Aqueous Solution Containing 0.1-200 mg. per Liter of Phenoxy Aliphatic Acid Preparatory to Rootless Sprouting—*B. B. Stoller to Lennys Foods, Inc., Duluth, Minn. No. 2,522,409. Sept. 12, 1950.*

Gluten Treated With Phosphoric Acid at Room Temperature and Neutralized With Sodium Hydroxide for Formation of Sodium Salt of Gluten Phosphate—*R. E. Ferrel, Hammond, Ore., and H. S. Olcott, Berkeley, Calif., to United States of America. No. 2,522,504. Sept. 19, 1950.*

Vegetables Treated With Steam Under Pressure in Vertical Cylindrical Blanching Chamber—*G. T. Hemmeter, Berkeley, Calif. to United States of America. No. 2,522,513. Sept. 19, 1950.*

Granular, Stable, and Preservable Product Made by Dehydrating and Defatting Soft Fish Roe by Repeated Treatment With Acetone and by Drying at low Temperature to Retain Active Constituents and Hormone Components in Unchanged Condition—*Lucette Bénard, Forest par Moutier-Rozeille, France, to Marc Antoine Eugene Assada, Villefranche-sur-Saone, France. No. 2,522,560. Sept. 19, 1950.*

Body Meat Recovered From Crabs and Freed of Viscera by Mechanical Means—*R. M. Johnson, Beaufort, S. C., to The Blue Channel Corp., Port Royal, S. C. No. 2,522,578. Sept. 19, 1950.*

Pastry Made From Frozen, Normally Plastic Shortening Ground to Dry, Free-Flowing Particles and Dry-Mixed With Flour Preliminary to Thawing, Adding Moisture, and Rolling—*L. H. Wilson and R. W. Wilson, Greenwich, Conn. No. 2,522,591. Sept. 19, 1950.*

Raw Sugar Juice Purified by Heating to 60 to 85 deg. C., Cooling to less than 25 C., Treating With Hydrogen Zeolite at pH 2 to 3, Removing Precipitate, Treating With Active Carbon, Filtering Preliminary to Neutralizing, and Subsequently Filtering for Removal of Precipitated Colloids—*L. A. Paley, Aurora, Ill. No. 2,522,797. Sept. 19, 1950.*

Bean Seeds Soaked to Double Weight, Planted in Covered Sprouting Vat, and Held Under Regulated Temperature Conditions With Watering at 4-hr. Intervals to Grow Bean Sprouts—*D. T. Persha and J. F. Paulucci, Duluth, Minn. No. 2,522,798. Sept. 19, 1950.*

Juice Extracted From Fruit by Action of Concavo-Convex Compression Units in Internal Chamber—*F. A. Quiroz, Newark, N. J. No. 2,522,800. Sept. 19, 1950.*

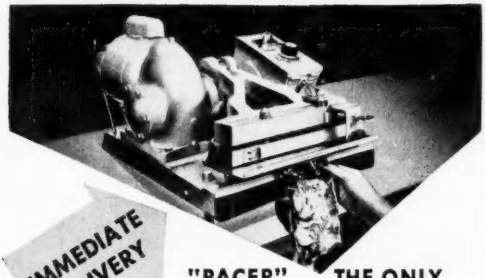
Sea Water Made Potable by Treatment With Silver Fluosilicate to Remove Chlorine Content, With Alkaline Calcium Compound to Remove Magnesium and Calcium Fluosilicate—*A. M. Buswell, Urbana, Ill., to United States of America. No. 2,522,856. Sept. 19, 1950.*

Fruits Graded for Size by Means of Circular Disk Secured to Vertical Rotatable Shaft and Containing Plurality of Spaced Fruit Receiving Openings—*Johan F. T. Zondagh, Avontuur, Union of South Africa. No. 2,522,917. Sept. 19, 1950.*

Properties of Pectins, Pectinic Acids, and Pectic Acid Modified by Treatment With Alkylene Oxide—*A. B. Steiner, La Jolla, and A. Miller, San Diego, Calif., to Kelco Co., San Diego. No. 2,522,970. Sept. 19, 1950.*

String Beans Graded by Mechanical Action of Combination of Outer Set of Spaced Rings, Inner Set of Spaced Rings, and Plurality of Bars Disposed Longitudinally Within and Adjacent to Inner Rings and Uniting Rings to Form Inner Drum Separate From Outer Drum Formed by Outer Set of Spaced Rings—*J. A. Pizzo, Portland, Ore., to Food Machinery & Chemical Corp. No. 2,523,055. Sept. 19, 1950.*

Eggs Broken in Continuous Manner in Machine Equipped With Plurality of Rotatable Egg Carry-



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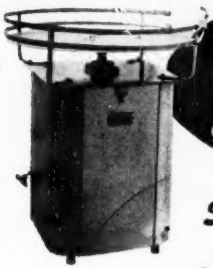

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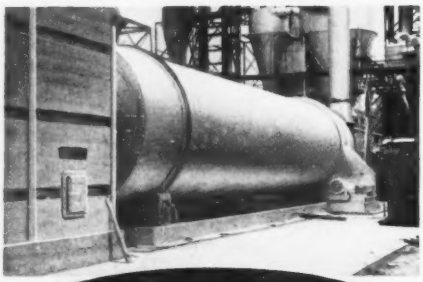

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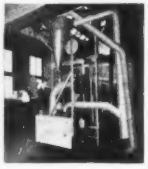

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Poultry Defeathered by Immersion in Water at Predetermined Temperature and Subjection to Impingement by Moving Resilient Pellets—*C. F. Hunt, Akron, O. No. 2,523,302. Sept. 26, 1950.*

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Raw Potatoes Cut Into Pieces, Dehydrated to About 75 Percent of Initial Weight in Current of Gas With Agitation to Keep Pieces Separate, Cooked Preliminary to Further Dehydration to 20-65 Percent of Initial Moisture Content, Extruded While Keeping Starch Cells Substantially Intact, and Further Dehydrated to Approximately 4 Percent of Initial Content of Raw Potato to Make Granular Products Capable of Being Rehydrated Into Mashed Potato—*C. Birdseye to Dehydration, Inc., Gloucester, Mass. No. 2,523,552. Sept. 26, 1950.*

Edible Oil-Miscible Vehicle Made to Contain Mono-ester of Citric Acid in Solution to the Amount of 15-37½ Percent—*H. W. Vahlteich, Edgewater, and R. H. Neal, North Bergen, N. J., and C. M. Gooding, Staten Island, N. Y., to The Best Foods, Inc., New York. No. 2,523,792. Sept. 26, 1950.*

Soya Oil Extracted With dry Furfural to Remove Free Fatty Acids, Sterols, Inhibitols, and Tocopherols—*S. W. Glover, Milwaukee, Wis., to Pittsburgh Plate Glass Co., Allegheny County, Pa. No. 2,524,103. Oct. 3, 1950.*

Bread Sliced by Endless Band Knives Operating in Vertical Plane—*H. J. Criner, ½ to A. G. Rush, Davenport, Iowa. No. 2,524,310. Oct. 3, 1950.*

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Solid Aqueous Gel Concentrate Convertible to Edible Dessert Jelly Made to Consist of Aqueous Partial Dispersion of Pectin, Edible Acid, Water Soluble Edible Salt of Polyvalent Metal, and Sweetening Agent—*G. L. Baker, Newark, Del., and M. Olliver, Histon, Cambridge, England, to Chivers & Sons, Ltd., Histon, England. No. 2,524,416. Oct. 3, 1950.*

Thin Fluid Batter for Cakes and Muffins Making Compounded in Continuous Manner With Incorporation of Gases to Cause Expansion During Baking—*G. F. Garnatz, Cincinnati, Ohio, and B. D. Miller, Louisville, Ky., to The Girdler Corp., Louisville. No. 2,524,437. Oct. 3, 1950.*

Wax Bean Seeds and Like Removed From Pods by Action of Pair of Rollers Mounted for Rotation on Parallel Axis but not in Contact With Each Other and of Third Roller With Axis out of Plane of Axis of First Rollers but in Surface Contact With Them—*A. C. Daub, Kirkwood, Mo., ½ to E. J. Methudy, University City, Mo. No. 2,524,519. Oct. 3, 1950.*

Enzymes and Insulin Recovered From Pancreas Glands of Mammals by Extracting Finely Divided Glands With Acid-Reacting Aqueous Medium at pH Above 1 and Temperature in Range of 0 to 25 deg. C. for less Than 24 hr.—*Svend Emil Frederiksen, Charlottenlund, Denmark, to Novo Terapeutisk Laboratoriumas, Copenhagen, Denmark. No. 2,524,658. Oct. 3, 1950.*

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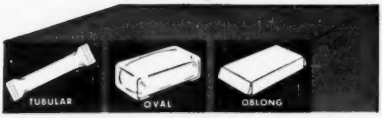
Soya Meal Extracted With Hexane Further Refined by Second Extraction With Glycol Monomethyl Ether or Glycol Monoethyl Ether and Removal of Solvent—*H. O. Renner, Des Plaines, Ill., to J. R. Short Milling Co., Chicago, Ill. No. 2,524,991. Oct. 10, 1950.*

Chewing Gum Made to Contain 10 Percent of Finely Divided Mixture of 90 Percent Silica and 10 Percent Alumina Treated With Methyl Chlorsilanes—*K. K. Kearby, Cranford, N. J., to Standard Oil Development Co. No. 2,525,072. Oct. 10, 1950.*

Multiple Coatings of Treated Silicone Resins Removed From Baking Pans and Similar Articles by Treatment With Mixture of 45 Percent Sodium Metasilicate, 32 Percent Sodium Carbonate, and 23 Percent Borax—*W. Reeder and J. J. Russ to Campbell Taggart Research Corp., Dallas, Tex. No. 2,525,079. Oct. 10, 1950.*

Fresh Eggs Preserved by Breaking Into Transparent and Impervious Container, Expelling Air From Container, Hermetically Sealing it and Deep Freezing—*F. G. Damuth, Carlsbad, Calif., to C. G. Stratton, Los Angeles. No. 2,525,096. Oct. 10, 1950.*

—End



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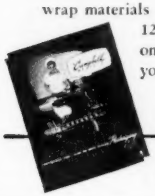

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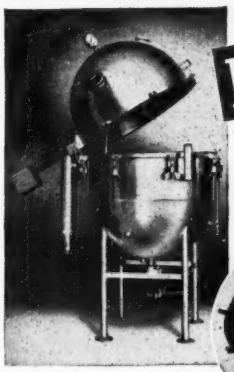

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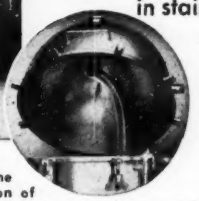

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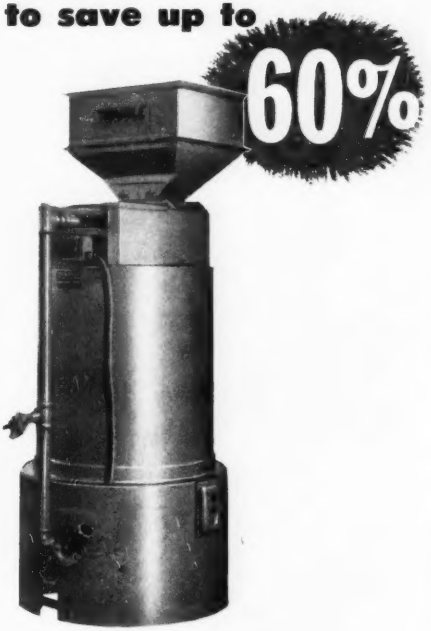

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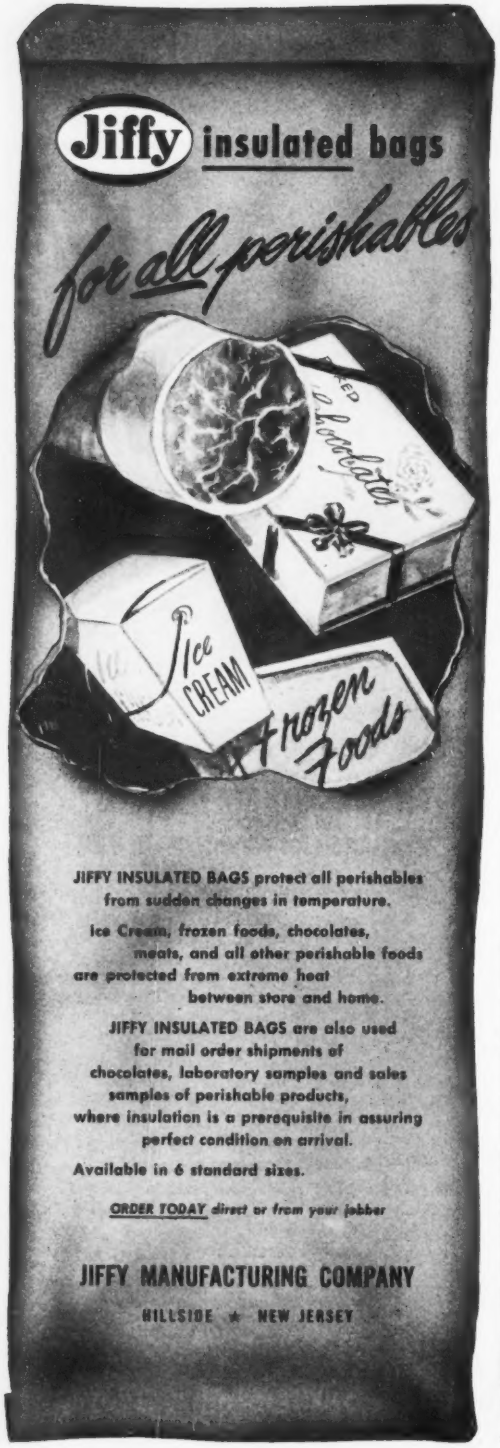

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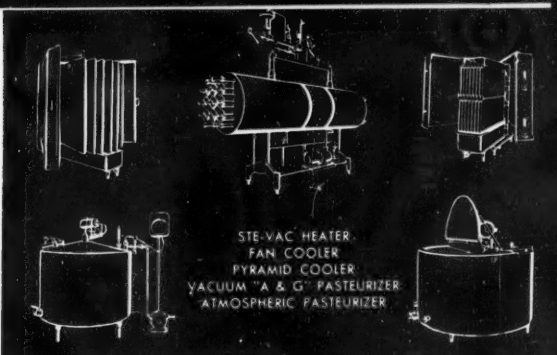

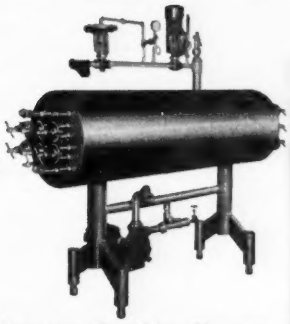

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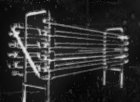
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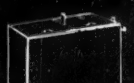

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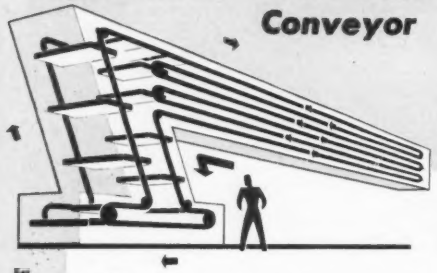

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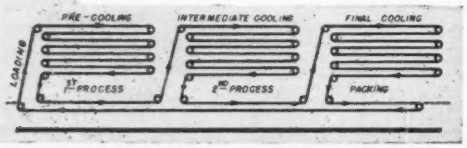

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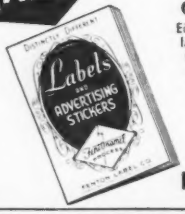

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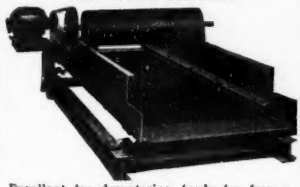

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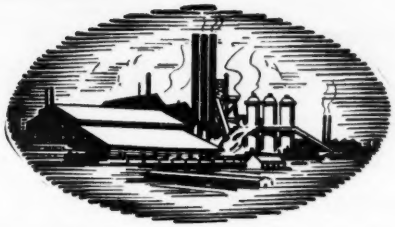
W. C. 2. Aldwych House, Aldwych



1900 ★ THE MIRACLE OF AMERICA ★ 1950

Freedom and Progress

It's no stretch of the imagination, rather, robust realism to call our past half century a Miracle—U. S. A.

America has set an amazing record of progress in 50 years—but a moment in the history of civilization. A record unequalled by any other political or economic system.

Merely by broad brush strokes, we can all visualize this miracle. Remember the crystal set, the hand-cranked car, the biplane? A far cry from our FM radio, television, hydro-matic drive and supersonic planes.

And here's another phase of the miracle that went hand-in-hand with these and the myriad of intertwined technological advances—ranging from the radio telephone and Bakelite to the X-ray tube and teletype . . . and to atomic energy and its untold potentialities.

- ★ Since 1900 we have increased our supply of machine power 4½ times.
- ★ Since 1900 we have more than doubled the output each of us produces for every hour we work.
- ★ Since 1900 we have increased our annual income from less than $2400 per household to about $4000 (in dollars of the same purchasing power), yet . . .
- ★ Since 1900 we have cut 18 hours from our average work week—equivalent to two present average workdays.

How did we do it? The basic cause for this composite miracle has been the release of human energy through FREEDOM, COMPETITION and OPPORTUNITY. And one of the most important results is the fact that more people are able to enjoy the products of this free energy than in any other system the world has ever known.

THIS IS THE MIRACLE OF AMERICA . . . it's only beginning to unfold.

A PUBLIC SERVICE PROJECT ★ THE ADVERTISING COUNCIL ★

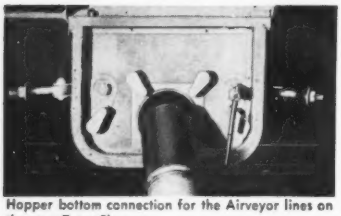
Published in the public interest by:

McGraw-Hill Publications

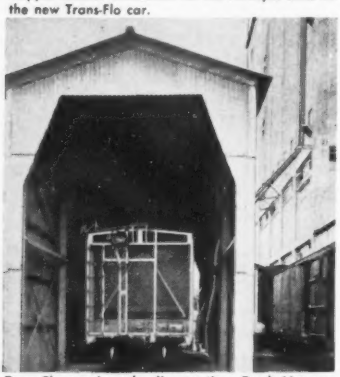
Handling flour in bulk

outmodes all other methods

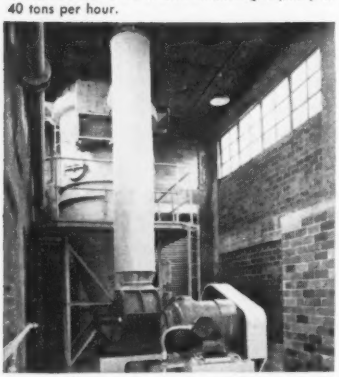
IT'S ECONOMICAL—SAFE—SANITARY



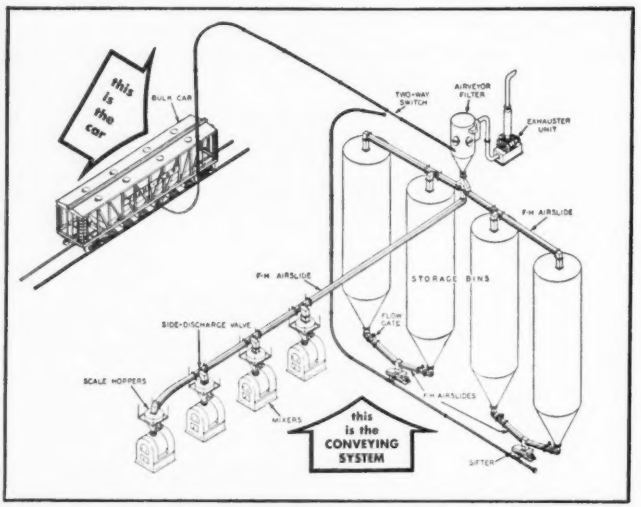
Hopper bottom connection for the Airveyor lines on the new Trans-Flo car.



Trans-Flo car in unloading station. Dual Airveyor conveying lines pass through shed wall and continue up the side of the building to storage or to mixers. Each has a capacity of 20 tons per hour, can be combined for a total unloading capacity of 40 tons per hour.



Airveyor filter type receiver, exhauster and motor assembly in foreground. This is the power supply of the Airveyor system, furnishing a continuous flow which draws flour from the car into the self-cleaning filter. Filter discharges into storage or process bins through a rotary air lock.



Typical Fuller System which uses the Airveyor for unloading flour from the Trans-Flo car to storage bins and the Airslide to reclaim it from storage to mixers in the bakery.

Cooperating with General American Transportation Corp., Fuller has developed a new method of bulk handling of dry pulverized and granular food ingredients . . . in-transit and in-plant. It meets all sanitary requirements of Federal, State and Municipal Agencies — it reduces unloading and conveying time—keeps infestation at the minimum.

Handling at the mill, in-transit and in-process is cleaner and more sanitary. There's no dusting. It's more economical because bags and barrels are eliminated as well as transportation of this tare; man hours are cut; there's no material waste.

Other than the blower and feeder, there are few moving parts; maintenance is reduced, reliability improved. Sharp turns and pockets where flour or similar products might accumulate and infestation occur are eliminated. The system can be blown completely free of all lading. Retention of all visible dust is assured. The only power needed is a source of low pressure air.

It will pay you to investigate the possibilities of pneumatic foodstuff handling in your plant. It improves quality, it's economical, efficient, safe and sanitary. A letter will bring a Fuller Engineer who will analyze your present conveying systems without obligation to you.

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS
COMPRESSORS AND VACUUM PUMPS
FEEDERS AND ASSOCIATED EQUIPMENT

fuller

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Chicago 3 — 120 So. LaSalle St.
San Francisco 4 — 420 Chancery Bldg.

6999

A-FH-3

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Circle numbers of items you want to know more about; fill in your name and address; drop in mail (no postage required). We will tell companies what you are interested in and they reply direct to you.

TO MAKE IT HANDY

Products and literature in this issue are listed on these pages. There are two indexes: (1) editorial items on new equipment, new plant and packaging supplies, new literature; and (2) products advertised.

WHAT THE NUMBERS MEAN

Editorial Items: Numbers on postcard correspond with those in the index below.

Advertisements: There is a page number on the postcard for each advertisement. Before the number may appear, L, R, T, B (left, right, top, bottom) locating the ad on the page; small letters following (a, b, c) indicate additional products in the advertisement.

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YOUR READER SERVICE CARD

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APRIL, 1951

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330 West 42nd Street

New York 18, N. Y.

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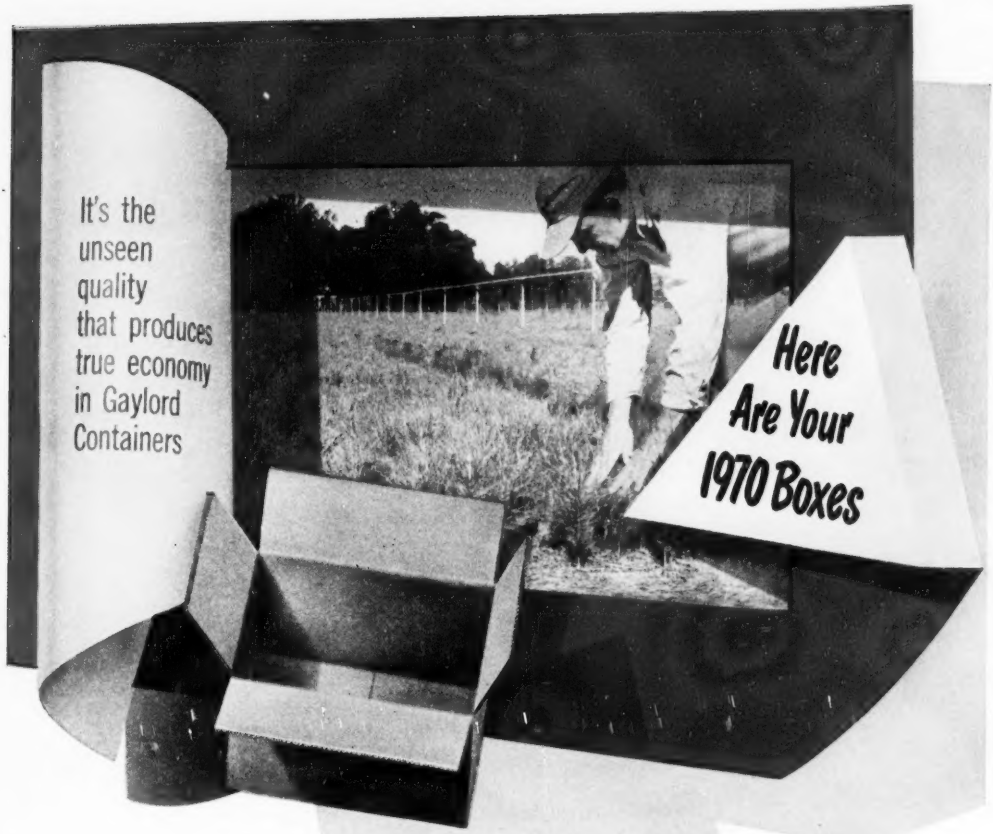

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FOLDING CARTONS
KRAFT BAGS AND SACKS
KRAFT PAPER AND SPECIALTIES

From the moment the seedling is planted by Gaylord foresters until the shipping container is delivered, every step in growing and manufacturing is supervised by Gaylord specialists. It's this kind of experienced control that enables Gaylord to build boxes of unsurpassed quality for many of the country's largest users.

Gaylord Boxes

262

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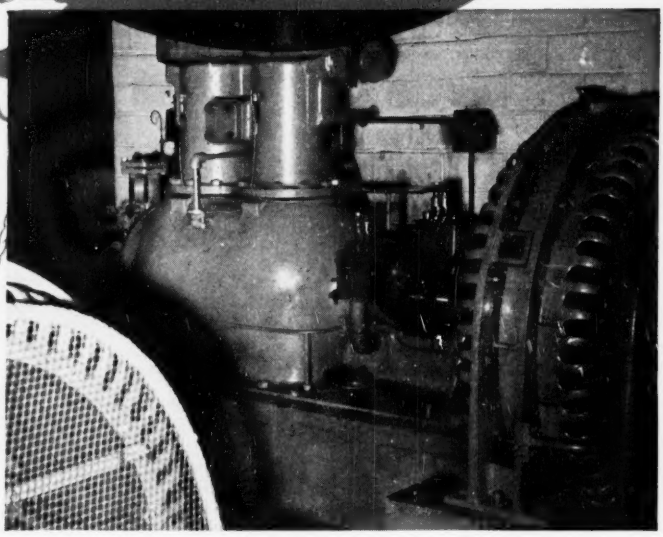
REDUCE COMPRESSOR MAINTENANCE COSTS

Bring 'em down with

TEXACO CAPELLA OILS



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Texaco Capella Oils are extremely stable and are noted for their high resistance to carbon, gum and sludge formations. They are moisture-free, do not react with refrigerants, and have very low pour tests. Preferred by operators everywhere, *Texaco Capella Oils* are available in every needed viscosity.

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TEXACO Capella Oils

FOR ALL AIR CONDITIONING AND REFRIGERATING EQUIPMENT

TEXACO

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